

THEIVANAI AMMAL COLLEGE FOR WOMEN

(AUTONOMOUS)

(Affiliated to the Annamalai University - Chidambaram)
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தமிழாய்வுத்துறை இளங்கலைத்தமிழ்

முகவுரை

ஆறு பருவங்களுக்குரிய பாடத்திட்ட வடிவமைப்பு இடம்பெற்றுள்ளது. மூன்று மற்றும் நான்காம் பருவத்திற்குரிய பாடத்திட்டம் மற்றும் அகமதிப்பீட்டுக் கூறுகள் இடம்பெற்றுள்ளன. இப்பாடத்திட்டமானது 2023 – 2026 ஆம் கல்வியாண்டுகளில் பயிலும் மாணவியர்களுக்கு உரியது.

பாடத்திட்ட அமைப்பு : இளங்கலைத்தமிழ் (B.A)

பாடத்திட்டப் பயன்கள்

- PSO – 1 தமிழ் இலக்கியம் மற்றும் இலக்கணங்களின் வளர்ச்சி நிலைகளை அறிந்து கொள்வர்.
- PSO – 2 தமிழர் வரலாற்றினையும் பண்பாட்டினையும் புரிந்து கொள்வர்.
- PSO – 3 இலக்கியம் வழி கண்டறிந்த நெறிகளை வாழ்வில் பொருத்திப் பார்க்கும் திறனைப் பெறுவர்.
- PSO – 4 தமிழில் கூறுகின்ற மெய்மைகளைக் காரண காரிய அடிப்படையில் பகுத்தாய்வர்.
- PSO – 5 தமிழ் இலக்கியம் முன்மொழிகின்ற செந்நெறிகளை மதிப்பிட்டு ஆராயும் திறன் பெறுவர்.
- PSO – 6 தமிழ் இலக்கிய வகைமைகளைக் கற்றுத்தெளிந்து புத்திலக்கியங்களைப் படைக்கும் திறன் மற்றும் பணி வாய்ப்பினைப் பெறும் திறன் பெறுவர்.

பருவம்	பிரிவு	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	வாரம் மணி நேரம்	தரம்	
						Min/ Max	
I	I	தமிழ் – I	UTAL109/ UTAL110/	தமிழியல் கல்வி ஆதார வளங்கள் / பொதுத்தமிழ் - I	5	3	
	II	ஆங்கிலம் – I	UENL111	General English – I	5	3	
	III	முதன்மைப்பாடம் - I	UTAM111	இக்கால இலக்கியங்கள்	5	4	
		முதன்மைப்பாடம் - II	UTAM112	தமிழக வரலாறும் பண்பாடும்	5	4	
		சார்புப்பாடம் – I (மரபு சார்ந்தது)	UTAA113	நாட்டார் மரபுகள்	4	3	
	IV	துறைசாரா விருப்பப்பாடம்- I (திறன் சார்ந்தது)			2	2	
		அடித்தளப்பாடம்	UTAF101	அடிப்படை தமிழ் இலக்கணம்	2	2	
		திறன்சார் கல்வி – I	USKS101		2	2	
	மொத்தம்					30	23

II	I	தமிழ் - II	UTAL209/ UTAL210	தமிழ் மொழி அமைப்பியல் / பொதுத்தமிழ் - II	5	3
	II	ஆங்கிலம் - II	UENL211	General English - II	5	3
	III	முதன்மைப்பாடம் - III	UTAM207	அறநெறி இலக்கியம்	5	4
		முதன்மைப்பாடம் - IV	UTAM208	தமிழிலக்கிய வரலாறு	5	4
		சார்புப்பாடம் - II (துறை சார்ந்தது)	UTAO209	காலந்தோறும் தமிழ் மொழி வரலாறு	4	3
		துறைசாரா விருப்பப்பாடம்- II (திறன் சார்ந்தது)			2	2
		துறைச்சார் விருப்பப்பாடம் - I (திறன் சார்ந்தது)	UTAD205	அறிவியல் தமிழ்	2	2
		திறன்சார் கல்வி - II	USKS201		2	2
	III	கல்வியிடைப்பயிற்சி / தொழிற்சார் பயிற்சி / களஆய்வு	UINS201		-	-/2
	V	கூடுதல் சேவை				1/2
VI	மதிப்பீட்டுப் பாடங்கள்	UCTAM201			-/2	
மொத்தம்					30	24/29
III	I	தமிழ் - III	UTAL309/ UTAL310	தமிழும் பொருண்மையியலும் / பொதுத்தமிழ் - III	5	3
	II	ஆங்கிலம் - III	UENL311	General English - III	5	3
	III	முதன்மைப்பாடம் - V	UTAM307	காப்பிய இலக்கியங்கள்	4	4
		முதன்மைப்பாடம் - VI	UTAM308	நன்னூல் - எழுத்து	4	4
		சார்புப்பாடம் - III (துறை சார்ந்தது)	UTAO307	சித்தர் இலக்கியமும் சித்த மருத்துவமும்	4	3
		துறைசார் விருப்பப்பாடம் - II	UTAD301	பெண்ணியமும் இலக்கியமும்	2	1
		துறைசார் விருப்பப்பாடம் - III (தொழில்முனைவு சார்ந்தது)	UTAE302	தொழில் முனைவுத் தமிழ்	2	2
		திறன்சார் கல்வி - III	USKS301		2	2

	IV	மதிப்பீட்டுக்கல்வி - I			2	2
மொத்தம்					30	24
IV	I	தமிழ் - IV	UTAL409/ UTAL410	தமிழர் கலைகள் / பொதுத்தமிழ் - IV	5	3
	II	ஆங்கிலம் - IV	UENL411	General English - IV	5	3
	III	முதன்மைப்பாடம் - VII	UTAM406	பக்தி இலக்கியம்	5	4
		முதன்மைப்பாடம் - VIII	UTAM407	நன்னூல் - சொல்	5	4
		சார்புப்பாடம் - IV	UTAO405	கணினியும் இணையமும்	4	3
		இணையப்பாடம்		Spoken Tutorial	2	2
		துறைசார் விருப்பப்பாடம்- IV	UTAD404	பணிவாய்ப்புத் தமிழ்	2	2
	திறன்சார் கல்வி - IV	USKS401		2	2	
	III	கல்வியிடைப்பயிற்சி / தொழிற்சார் பயிற்சி / களஆய்வு	UINS401			-/2
	V	கூடுதல் சேவை				-/2
VI	மதிப்பீட்டுப் பாடங்கள்				-/2	
மொத்தம்					30	23/29
V	III	முதன்மைப்பாடம் - IX	UTAM511	சிற்றிலக்கியங்கள்	5	4
		முதன்மைப்பாடம் - X	UTAM512	இலக்கணம் - பொருள்	5	4
		முதன்மைப்பாடம் - XI	UTAM513	நாட்டுப்புறவியல்	5	4
		சார்புப்பாடம் - V	UTAO515 UTAO516 UTAO517	தமிழ் மரபு மருத்துவம் / தமிழில் சிறுகதைகள்/ மொழியியல்	5	3
		சார்புப்பாடம் - VI	UTAO518 UTAO519 UTAO520	தமிழ் பண்பாட்டு வரலாறு / பெண்ணியப்படைப்புகள்/ படைப்பிலக்கியமும் மொழிபெயர்ப்பும்	4	3
		குறுந்திட்டம் / முதன்மைப்பாடம் - XII	UTAM514	புலம்பெயர்ந்தோர் இலக்கியம்	4	4
	IV	சுற்றுச்சூழல்கல்வி - I	UGEV501		2	2
மொத்தம்					30	24

VI	III	முதன்மைப்பாடம் - XIII	UTAM611	சங்க இலக்கியம்	5	4
		முதன்மைப்பாடம் - XIV	UTAM612	இலக்கணம் – யாப்பும், அணியும்	5	4
		முதன்மைப்பாடம்- XV	UTAM613	இலக்கியத் திறனாய்வு	5	4
		சார்புப்பாடம் – VII	UTAO614	திராவிட மொழிகளின் ஒப்பிலக்கணம்	6	4
		சார்புப்பாடம் – VIII	UTAO615 UTAO616 UTAO617	அயலகத் தமிழ் இலக்கியம் / பாரதியியல் / இணையத்தமிழ் இதழ்கள்	5	3
		தொழிற்முறைக்கல்வி	UTAC601	போட்டித் தேர்வுக்களுக்கிரிய இலக்கிய இலக்கண வரலாறு	4	2
		பொதுவாய்மொழித் தேர்வு			-	1
	III	கல்வியிடைப்பயிற்சி / தொழிற்சார் பயிற்சி / களஆய்வு			-	-/2
	V	கூடுதல் சேவை				-/2
	VI	மதிப்பீட்டுப் பாடங்கள்			-	-
மொத்தம்					30	22/26
கூட்டு எண்ணிக்கை					180	140 /155

காப்பிய இலக்கியங்கள்

UTAM307

பருவம் : மூன்றாம் பருவம்
பிரிவு : முதன்மைப்பாடம் – V
வகுப்பு : II BA தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 04
மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	காப்பியத்தின் தோற்றம் வளர்ச்சி நிலைகளைப் புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	காப்பிய வகைமைகளைப் பொருத்திப் பார்க்கச் செய்தல்
கற்றல் நோக்கம் 3	காப்பியத்தின் பொருண்மைகளைப் பகுத்தாராய்ச் செய்தல்
கற்றல் நோக்கம் 4	காப்பிய இலக்கியத்தின் மாண்புகளையும் சமூக மதிப்புகளையும் அறிந்து மதிப்பிடச் செய்தல்
கற்றல் நோக்கம் 5	காப்பிய இலக்கியம் எடுத்துரைக்கும் நன்நெறிகளை அறியும் திறன் பெறச் செய்தல்.

அலகு 1 சிலப்பதிகாரம், மணிமேகலை

12 மணி நேரம்

சிலப்பதிகாரம் – அடைக்கலக் காதை - மணிமேகலை - சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கிய காதை

அலகு 2 சீவக சிந்தாமணி, சூளாமணி

10 மணி நேரம்

சீவக சிந்தாமணி - விமலையார் இலம்பகம் - சூளாமணி - நகரச் சருக்கம்

அலகு 3 கம்பராமாயணம், பெரியபுராணம்

10 மணி நேரம்

கம்பராமாயணம் - சூகப் படலம், பெரியபுராணம்- கண்ணப்ப நாயனார் புராணம்

அலகு 4 தேம்பாவணி, சீறாப்புராணம்

10 மணி நேரம்

தேம்பாவணி - நாட்டுப்படலம், சீறாப்புராணம் – மானுக்குப்பிணை நின்ற படலம்.

அலகு 5 குறுங்காவியம்

10 மணி நேரம்

தமிழ் ஒளி - வீராயி

பாடநூல்கள்

- சாமிநாதையர், உ.வே. (2019). சிலப்பதிகாரம். உ.வே. சா. நூல் நிலையம். சென்னை.
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- ஆசான் ஞானசம்பந்தன். 2004. கம்பராமாயணம். கம்பன் டிரட்ஸ். கோவை.

பார்வை நூல்கள்

- சீனிவாசன், து. 1985. தமிழில் காப்பிய கொள்கை. தமிழ்ப் பல்கலைக்கழகம். தஞ்சாவூர்.
- ஞானசம்பந்தம். அ.ச. 1982. பெரியபுராண ஆராய்ச்சி. தேம்பாவணி. மரிய அந்தோணி. வீரமாமுனிவர் ஆய்வுக் களம். பாளையங்கோட்டை

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	காப்பியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	காப்பிய வகைமைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	காப்பியத்தின் பொருண்மைகளை பகுத்தாராய்வர்.	K4
கற்றல் பயன் 4	காப்பிய இலக்கியத்தின் மாண்புகளை இக்கால சூழலுடன் மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	காப்பிய இலக்கியம் எடுத்துரைக்கும் நன்நெறிகளை அறிந்து சமூகத்தில் கடைபிடித்தல் மற்றும் படைப்புகளில் வெளிப்படுத்தும் திறன் பெறுவர்.	K6

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	2	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 73%

இடைநிலை இணைநிலை 27%

குறைதர இணைநிலை -

நன்னூல் (எழுத்து)

UTAM308

பருவம் : மூன்றாம் பருவம்
பிரிவு : முதன்மைப்பாடம் – VI
வகுப்பு : II BA தமிழ்

தரம் : 04
மணிநேரம்/வாரம் : 04
மொத்த மணிநேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராயச் செய்தல்.
கற்றல் நோக்கம் 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெறச் செய்தல்.

அலகு 1

12 மணி நேரம்

பாயிரவியல் - எழுத்தியல்.

அலகு 2

10 மணி நேரம்

பதவியல்

அலகு 3

10 மணி நேரம்

உயிரீற்றுப் புணரியல்.

அலகு 4

10 மணி நேரம்

மெய்யீற்றுப் புணரியல்.

அலகு 5

10 மணி நேரம்

உருபுப் புணரியல்.

பாடநூல்கள்

- ஆறுமுக நாவலர், (உரை). (2002). நன்னூல். எழுத்ததிகாரம். சைவ சித்தாந்த நூற்பதிப்புக் கழகம். சென்னை.

பார்வை நூல்கள்

- பாண்டியன், இராச. (2002). நன்னூல் எழுத்ததிகாரம். சென்னை.
- கண்ணன்.கு. நன்னூல் எழுத்ததிகாரம். (2006). பாவை பப்ளிகேஷன்ஸ். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெறுவர்.	K6

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 70%

இடைநிலை இணைநிலை 30%

குறைதர இணைநிலை -

சித்தர் இலக்கியமும் சித்த மருத்துவமும்

UTAO307

பருவம் : மூன்றாம் பருவம்

பிரிவு : சார்புப்பாடம் - III

வகுப்பு : II BA தமிழ்

தரம் : 03

மணிநேரம் / வாரம் : 04

மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	சித்தர் மற்றும் சித்த இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	சித்தர் இலக்கிய வகைமைகளைப் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	சித்தர்களின் தத்துவச் சிந்தனைகள், சித்த மருத்துவம் குறித்து அறிந்துகொள்வதோடு, தமிழகத்தில் காணப்படும் மூலிகைகளின் மருத்துவ இயல்புகளை அறிந்து பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	தமிழகத்தில் காலந்தோறும் சித்த மருத்துவம் பெற்ற வளர்ச்சியினை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	அறிந்துகொண்ட சித்தமருத்துவ அறிவைக்கொண்டு, தம்மையும் பிறரையும் நோய்களிலிருந்து காத்துக்கொள்ளச் செய்தல்.

அலகு 1 சித்தர்களும் சித்த மருத்துவமும்

12 மணி நேரம்

சித்தர்கள் பெயர்க்காரணம் - சித்தர்களின் எண்ணிக்கை - 18 என்கிற வரையறை - சித்தர்களின் வாழ்க்கை முறை - சித்தர்களின் இறைக்கொள்கை சித்தர்களின் மனித உயிர், உடல், உள்ளம் பற்றிய சிந்தனைகள்

அலகு 2 சித்தர் பாடல்கள்

10 மணி நேரம்

சித்தர் பாடல்களில் இறை, உயிர்பற்றிய கருத்துகள் - உடற்பயிற்சி, உள்ளப் பயிற்சி, மருத்துவம் முதலான வாழ்வியல் செய்திகள் - சித்தர் பாடல்களில் காணப்படும் சிந்து, கண்ணி முதலான வடிவங்களும் குறியீடு முதலான உத்திகளும்.

அலகு 3 தமிழ் இலக்கியங்களில் மருத்துவம்

10 மணி நேரம்

சித்தமருத்துவத்தின் தோற்றமும் வளர்ச்சியும் - பதினெண் சித்தர்கள் - சித்த மருத்துவப் பாடல்கள் - நோய் கண்டறியும் முறைகள் - சித்த மருத்துவ அருஞ்சொற்கள் - திருக்குறளில் சித்த மருத்துவச் செய்திகள் - திரிகடுகம் சிறப்புப் பாயிரம் (1) - சிறுபஞ்சமூலம் (74) - பழமொழி நானூறு (56, 176) - நான்மணிக்கடிகை (12) - ஆசாரக்கோவை (57) - முதுமொழிக்காஞ்சி (15, 87, 94) - ஆத்திசூடி (16, 70, 76, 91) - கொன்றை வேந்தன் (60) - நீதிவெண்பா (9) ஆகிய நூல்களில் இடம்பெற்றுள்ளபாடல்களில் காணப்படும் மருத்துவச் செய்திகள்.

அலகு 4 மூலிகை, குடிநீர், சூரணம்

10 மணி நேரம்

அதிமதுரம், அத்தி, அரசு, அல்லி, அறுகீரை, ஆடாதொடை, ஆல், இஞ்சி, சுக்கு, எருக்கு, எலுமிச்சை, ஏலம், கசகசா,கடுக்காய், கண்டங்கத்தரி ஆகிய பதினைந்து மூலிகைகளில் காணப்படும் மருத்துவச் செய்திகள் - சித்த மருத்துவக் குடிநீர் வகைகள்: நிலவேம்புக் குடிநீர், சித்தரத்தைக் குடிநீர், மண்டுரக்குடி நீர், இம்பூரல் குடிநீர், திராட்சைக் குடிநீர், கடுக்காய் குடிநீர், கரும்வேலம்பட்டைக் குடிநீர், நொச்சிக் குடிநீர், கீழாநெல்லிக் குடிநீர், நீர்முள்ளிக் குடிநீர் - சித்தமருத்துவச் சூரண வகைகள்: திரிகடுகு சூரணம், திரிபலை சூரணம், அஷ்ட தீபாக்கினிச் சூரணம், நில ஆவாரை சூரணம், அமுக்கரா சூரணம், ஏலாதி சூரணம், தாளிசாதி சூரணம், பறங்கிப்பட்டை சூரணம், பஞ்ச தீபாக்கினிச் சூரணம், பற்பொடிச் சூரணம்.

அலகு 5 சிறப்பு மூலிகைகள்

10 மணி நேரம்

கரிசலாங்கண்ணி, கறிவேம்பு, காட்டவூரி, கிராம்பு, கீழாநெல்லி, குப்பைமேனி, குமரி, சாதிக்காய், சிறுகீரை, சீரகம், சுரை, சேம்பு, திப்பிலி, திருநீற்றுப் பச்சிலை, துத்தி, துளசி, தூதுவேளை, நன்னாரி, நித்தியச் கல்யாணி, நிலவேம்பு, நெல்லி, பப்பாளி, பிரண்டை, பெருங்காயம், பேரீச்சு, மஞ்சள், மணத்தக்காளி, மாசிக்காய், மாதுளை, மிளகு, முருங்கை, வசம்பு, வெந்தயம், வெற்றிலை, வேம்பு ஆகிய மூலிகைகளில் காணப்பெறும் மருத்துவச் செய்திகள்

பாடநூல்கள்

- தமிழ்ப்பிரியன், (2014). சித்தர் பாடல்கள் மூலமும் உரையும். கற்பகம் புத்தகாலயம். சென்னை.
- தெய்வநாயகம், சிகோ. (2017). சித்தர் சிந்தனைகள். மணிவாசகர் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- திருஞானம்,க. (2016). மூலிகை மருத்துவம் (பாகம் -1 மற்றும் -2). செல்வி பதிப்பகம். திருச்சிராப்பள்ளி.
- பிரம்மதண்டி,ம.சு. சித்தர்களின் வரலாறும் வழிபாட்டு முறைகளும். கற்பகம் புத்தகாலயம். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	சித்தர் மற்றும் சித்த இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்து புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	சித்தர் இலக்கிய வகைமைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	சித்தர்களின் தத்துவச் சிந்தனைகள், சித்த மருத்துவம், குறித்து அறிந்துகொள்வதோடு, தமிழகத்தில் காணப்படும் மூலிகைகளின் மருத்துவ இயல்புகளை அறிந்து பகுத்தாராய்வார்.	K4
கற்றல் பயன் 4	தமிழகத்தில் காலந்தோறும் சித்த மருத்துவம் பெற்ற வளர்ச்சிநிலைகளை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	அறிந்துகொண்ட சித்தமருத்துவ அறிவைக்கொண்டு, தம்மையும் பிறரையும் நோய்களிலிருந்து காத்துக்கொள்ளும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 80%

இடைநிலை இணைநிலை 20%

குறைதர இணைநிலை -

பெண்ணியமும் இலக்கியமும்

UTAD301

பருவம் : மூன்றாம் பருவம்

தரம் : 01

பிரிவு : துறைசார் விருப்பப்பாடம் - II

மணி நேரம் / வாரம் : 02

வகுப்பு : II B.A. தமிழ்

மொத்த மணி நேரம் : 26

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் - 1	பெண்ணியத்தின் தோற்றம் வளர்ச்சி நிலைகள், வகைகள் குறித்து புரிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம் - 2	பெண்ணியப் படைப்புகளின் வாயிலாக பெண்ணியத்தின் இயல்புகளை பொருத்திப் பார்க்கச் செய்தல்.
கற்றலின் நோக்கம்; - 3	பெண்ணிய கோட்பாட்டினை காலந்தோறும் பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் - 4	பெண்ணியக் கருத்துக்களை அறிந்து படைப்பிலக்கியங்களில் மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் - 5	பெண்ணியத்தினை பின்பற்றி சமுதாயத்தில் ஆளுமைத்திறனை பெண்கள் பெறும் வழிமுறைகளை நடத்தை மற்றும் படைப்புகளின் வாயிலாக சமூகத்தில் புகுத்தும் திறன் பெற செய்தல்.

அலகு 1 பெண்ணியம் விளக்கம்

06 மணி நேரம்

பெண்ணியம் நோக்கம் - வரலாறு - பெண்ணியவாதிகள் - மேலைநாட்டுத் தமிழகப் பெண்ணியவாதிகள் - பெண்ணியவாதி யார்? - தமிழகத்தில் பெண் விடுதலைக்குப் பாடுபட்டோர் - செயல் புரிந்தோர்

அலகு 2 பெண்ணிய வகைகள்

05 மணி நேரம்

மிதவாதப்பெண்ணியம் - ஆன்மீகப் பெண்ணியம் - கலாச்சாரப் பெண்ணியம் - கிருத்துவப் பெண்ணியம் - இந்தியப் பெண்ணியம் - பெரியார் பெண்ணியம்

அலகு 3 தமிழ் இலக்கியங்களில் பெண்ணியம்

05 மணி நேரம்

காலந்தோறும் மகளிர் நிலை (சுருக்கமாக) சங்க இலக்கியம் - பெண்பாற்புலவர்கள் - படைப்பு ஒரு மதிப்பீடு - காரைக்கால் அம்மையார் - ஆண்டாள் - பெண்ணிய நோக்கில் மதிப்பிடல் - இன்றையப் படைப்பிலக்கியங்களில் பெண்கள் சித்தரிக்கப்படும் முறை.

அலகு 4 பெண்ணிய எழுத்தாளர்களும் படைப்புக்களும்

05 மணி நேரம்

இன்றைய பெண்ணியப் பெண் எழுத்தாளர்கள் - படைப்பும் அறிமுகமும் - கவிதை - சிறுகதை - நாடகம் - நாவல் - பெண்ணியப் படைப்பின் உத்திகள்.

அலகு 5 பெண்ணிய கோட்பாடுகள்

05 மணி நேரம்

பெண்ணியம் - ஆய்வியல் கோட்பாடுகள் - பெண்ணியக் கருத்தாக்கங்கள் - தமிழகப் பெண்ணிய ஆய்வுகளை மதிப்பீடு செய்தல்.

பாட நூல்கள்

- முத்துச் சிதம்பரம். (2005). பெண்ணியம் - தோற்றமும் வளர்ச்சியும். தமிழ்ப்புத்தகாலயம். சென்னை.
- பிரேமா, இரா. (2012). பெண்ணியம். தமிழ்ப்புத்தகாலயம். சென்னை.
- சண்முகசுந்தரம். (2007). பெண்ணியமும் கலை இலக்கியப் பிரதிகளும். காவ்யா வெளியீடு. சென்னை.

பார்வை நூல்கள்

- அரங்கமல்லிகா. (2011). தமிழ் இலக்கியமும் பெண்ணியமும். நியூ செஞ்சரி புக் ஹவுஸ். சென்னை.
- ஓவியா. (2021). ஆதிப் பெண்ணின் அடி தேடி. கருஞ்சட்டைப் பதிப்பகம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	பெண்ணியத்தின் தோற்றம் வளர்ச்சி நிலைகள், வகைகள் குறித்து புரிந்து கொள்வர்.	K1, K2
கற்றலின் பயன்கள் 2	பெண்ணியப் படைப்புகளின் வாயிலாக பெண்ணியத்தின் இயல்புகளை பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றலின் பயன்கள் 3	பெண்ணிய கோட்பாட்டினை காலந்தோறும் பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றலின் பயன்கள் 4	பெண்ணியக் கருத்துக்களை அறிந்து படைப்பிலக்கியங்களில் மதிப்பிட்டு அறியும் திறன் பெறுவர்.	K5
கற்றலின் பயன்கள் 5	பெண்ணியத்தினை பின்பற்றி சமுதாயத்தில் ஆளுமைத்திறனை பெண்கள் பெறும் வழிமுறைகளை நடத்தை மற்றும் படைப்புகளின் வாயிலாக சமூகத்தில் புகுத்தும் திறன் பெறுவர்.	K6

C0/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 80%

இடைநிலை இணைநிலை 20%

குறைதர இணைநிலை -

தொழில் முனைவுத் தமிழ்

UTAE302

பருவம் : மூன்றாம் பருவம்

தரம் : 02

பிரிவு : துறைசார் விருப்பப்பாடம்- III

மணிநேரம் / வாரம் : 02

வகுப்பு : II BA தமிழ்

மொத்தமணி நேரம் : 26

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தொழில் முனைவின் அடிப்படைகள் குறித்து புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	தொழில் முனைவிற்கான வழிமுறைகளைப் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	தொழில் தொடங்குவதற்கான வாய்ப்பு நிலைகளைப் பகுத்தாராயச் செய்தல்.
கற்றல் நோக்கம் 4	தொழில் முனைவிற்கான திட்ட வரைகளை மதிப்பிடச் செய்தல்
கற்றல் நோக்கம் 5	தொழில் முனைவிற்கான வழிநிலைகளை அறிந்து தொழில் முனைவோராக மாறும் திறம் பெறச் செய்தல்.

அலகு 1 தொழில் முனைவோர் இலக்கணம் மற்றும் பொருள்

05 மணி நேரம்

தொழில் முனைவோர் - தொழில் முனைவோரின் குணங்கள் - தொழில் முனைவின் இயல்புகள் - தொழில் முனைவோரின் பணிகள் - தொழில் முனைவோரின் வகைகள் - பிறவகை தொழில் முனைவோர்கள் - தொழில்நுட்பம் சார்ந்த தொழில் முனைவோர் வகைகள் - தொழில் முனைவோரும் பொருளாதார நடவடிக்கையும் - தொழில் முனைவின் மேலாண்மை கிளை அமைப்புகள்

அலகு 2 தொழில் முனைவோர் என்பதன் பொருள்

05 மணி நேரம்

தொழில் முனைவோருக்கு உள்ள திறன்கள் - தொழில் முனைவோர் முடிவெடுத்தல் செயல் முறைகள் .

அலகு 3 வணிக கருத்துருவாக்கம்

05 மணி நேரம்

கருத்துருவாக்கம் - வணிக கருத்தரங்கம் - வணிக கருத்துருவாக்கம் முறைகள்

அலகு 4 வணிக திட்டங்கள்

05 மணி நேரம்

தொழில் திட்டமிடல் அல்லது வணிக திட்டமிடல் - தொழில் திட்டமிடல் என்பதன் பொருள் - வணிக திட்டமிடல் முக்கியத்துவம் - தொழில் திட்டமிடல் நோக்கங்கள் தொழில் திட்டமிடல் முக்கிய பண்புகள் - தொழில் திட்டமிடலின் உட்கூறுகள் தொழில் அகசூழல், புற சூழல்கள்

அலகு 5 தொழில் முனைவோர் கலாச்சாரம்

06 மணி நேரம்

கலாச்சாரம் - தொழில் முனைவோர் கலாச்சாரம் - கலாச்சாரத்தின் வகைகள் - கலாச்சாரத்தின் கூறுகள் - கலாச்சாரத்தின் பண்புகள் - தொழில் முனைவோர் சமுதாயம் - தொழில் முனைவோர் சமுதாயத்தின் பண்புகள் - அகத்தொழில் முனைவோர் முக்கியத்துவமும் தேவையும்.

பாடநூல்கள்

- இ.கார்டன் & கே.நடராஜன். (2004). தொழில் முனைவோர் மேம்பாடு. இமயமலை பதிப்பகம்.சென்னை

பார்வை நூல்கள்

- முனைவர் இராதா. (2014).தொழில்முனைவு மேம்பாடு. பிரசன்னா பதிப்பகம். சென்னை.
- மூர்த்தி,எஸ்.எல்.வி.(2009). தொழில்முனைவோர் கையேடு. கிழக்குப்பதிப்பகம்.சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	தொழில் முனைவின் அடிப்படைகள் குறித்து புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	தொழில் முனைவிற்கான வழிமுறைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	தொழில் தொடங்குவதற்கான வாய்ப்பு நிலைகளைப் பகுத்தாராய்வர்.	K4
கற்றல் பயன் 4	தொழில் முனைவிற்கான திட்ட வரைவு மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	தொழில் முனைவிற்கான வழிநிலைகளை அறிந்து தொழில் முனைவோராக மாறும் திறம் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 80%

இடைநிலை இணைநிலை 20%

குறைதர இணைநிலை -

பக்தி இலக்கியம்

UTAM406

பருவம் : நான்காம் பருவம்
பிரிவு : முதன்மைப்பாடம் – VII
வகுப்பு : II BA தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	பக்தி இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளைப் புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	பக்தி இலக்கிய வகைமைகளைப் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	பக்தி இலக்கிய படைப்பாக்க உத்தி முறைகளைப் பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	பக்தி இலக்கியத்தின் வெளிப்படும் சமூக நெறிகளை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	பக்தி இலக்கியத்தில் முழுமையான படிநிலைகளை அறிந்து சமுதாயத்தில் சமத்துவம் நன்னெறி ஆகியவற்றை வளர்த்தெடுக்கும் திறன் பெறச் செய்தல்.

அலகு 1 சைவம்

12 மணி நேரம்

1. திருஞானசம்பந்தர் - கோளறு பதிகம், வேயுறு தோழி பங்கன் எனத் தொடங்கும் பதிகம்.
 2. திருநாவுக்கரசர் தேவாரம் - மாசில் வீனையும் எனத் தொடங்கும் பதிகம். 3. மாணிக்கவாசகர் - பிடித்த பத்து.

அலகு 2 வைணவம்

15 மணி நேரம்

ஆண்டாள் - நாச்சியார் திருமொழி முழுமையும் - குலசேகர ஆழ்வார் - திருவித்தவக் கோட்டம்மா - திருமங்கை ஆழ்வார் - விற்பெருவிழாவும் எனத் தொடங்கும் திருமொழி.

அலகு 3 கிருத்துவம் - இசுலாமியம்

14 மணி நேரம்

எச்.ஏ. கிருட்டிணப்பிள்ளை இரட்சணிய மனோகரம், விசுவாசக் காட்சி முழுவதும் - குணங்குடி மஸ்தான் சாகிபு - ரகுமான் (முதல் 50 கண்ணிகள்).

அலகு 4 சிற்றிலக்கியங்கள் - I (சைவம், வைணவம்)

12 மணி நேரம்

பிள்ளை பெருமாள் ஐயங்கார்_ திருவரங்கக் கலம்பகம் மேகவிடு தூது ஊசல் (2 பாடல்கள்), வண்டு (1 பாடல்) அம்மாளை (1 பாடல்) நிமித்தம் (6 பாடல்). - கம்பர் - சடகோபர் அந்தாதி (30 பாடல்கள்)

அலகு 5 சிற்றிலக்கியங்கள் - II (கிருத்துவம், இசுலாமியம்)

12 மணி நேரம்

தேவநாயகம் பிள்ளை - தேவமாதா அந்தாதி முதல் (20 பாடல்) - சீதக்காதி நொண்டி நாடகம் - மாமு நயினர் நொண்டி (10 பாடல்கள்)

பாடநூல்கள்

- சிவஞானம், வீ. 2015. தேவாரம்_ விஜயா பதிப்பகம் கோவை
- ஆழ்வார்கள். 2016. நாலாயிர திவ்ய பிரபந்தம்_ வர்த்தமானப் பதிப்பகம், சென்னை.

பார்வை நூல்கள்

- அருணாச்சலம், பா.1973. பக்தி இலக்கியம், பாரி புத்தக நிலையம், சென்னை.
- லட்சுமணன், கீ. 1960. இந்திய தத்துவ ஞானம். பழனியப்பா பிரதர். சென்னை.
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வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	பக்தி இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	பக்தி இலக்கிய வகைமைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	பக்தி இலக்கிய படைப்பாக்க உத்தி முறைகளைப் பகுத்தாராய்வார்.	K4
கற்றல் பயன் 4	பக்தி இலக்கியத்தில் வெளிப்படும் சமூக நெறிகளை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	பக்தி இலக்கியத்தில் முழுமையான படிநிலைகளை அறிந்து சமுதாயத்தில் சமத்துவம் நன்னெறி ஆகியவற்றை வளர்த்தெடுக்கும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 74%

இடைநிலை இணைநிலை 26%

குறைதர இணைநிலை -

நன்னூல் – சொல்

UTAM407

பருவம் : நான்காம் பருவம்
பிரிவு : முதன்மைப்பாடம் – VIII
வகுப்பு : II BA தமிழ்

தரம் : 04
மணிநேரம்/வாரம் : 05
மொத்த மணிநேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெறச் செய்தல்.

- அலகு 1 10 மணி நேரம்
பெயரியல்.
- அலகு 2 10 மணி நேரம்
வினையியல்.
- அலகு 3 15 மணி நேரம்
பொதுவியல் – I (நூற்பா 352 முதல் 384 வரை)
- அலகு 4 15 மணி நேரம்
பொதுவியல் – II (நூற்பா 385 முதல் 419 வரை)
- அலகு 5 15 மணி நேரம்
இடையியல், உரியியல்.

பாடநூல்

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பார்வை நூல்கள்

- இளவரசு, சோம. (உரை). (2004). நன்னூல் சொல்லதிகாரம். காண்டிகையுரை. மணிவாசகர் பதிப்பகம். சென்னை.
- முகிலை ராசபாண்டியன், (உரை). (2008). நன்னூல் சொல்லதிகாரம். காண்டிகையுரை. மணிவாசகர் பதிப்பகம். சென்னை.

- ஸ்ரீசந்திரன், ஐ. (உரை) (2007). நன்னூல் காண்டிகையரை. வர்த்தமானன் பதிப்பகம். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெறுவர்.	K6

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 70%

இடைநிலை இணைநிலை 30%

குறைதர இணைநிலை -

கனிணியும் இணையமும்

UTAO405

பருவம் : நான்காம் பருவம்
பிரிவு : சார்புப்பாடம் – IV
வகுப்பு : II BA தமிழ்

தரம் : 03
மணிநேரம் / வாரம் : 04
மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	கணினித் தமிழின் தோற்றம் வளர்ச்சியினைப் புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	கணினித்தமிழின் படிநிலைகளைப் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	கணினியில் இணையத்தின் பயன்பாட்டு முறைகளைப் பகுத்தாராயச் செய்தல்
கற்றல் நோக்கம் 4	இணையத்தின் வளர்ச்சிபடிநிலைகளை மதிப்பிடச் செய்தல்
கற்றல் நோக்கம் 5	கணினி மற்றும் இணையம் பயன்படுத்தும் முறைகளை அறியும் திறன் பெறச்செய்தல்.

அலகு 1 கணினி அறிமுகம்

12 மணி நேரம்

கணினி தோற்றமும் வளர்ச்சியும் - கணினி தலைமுறைகள் வகைகள் - வன்பொருள் (Hardware) - மென்பொருள் (Software) - கணினி பயன்பாடு.

அலகு 2 கணினியின் அமைப்பு முறைகள்

10 மணி நேரம்

கணினியின் உள்ளீடு வெளியீடு - மையச் செயலகம் - வெளிப்புற உறுப்புகள் (peripheral unity) - படிக்க மற்றும் நினைவு (Read only Memory) - தற்செயல் அணுகு நினைவு (Random Access Memory) - சேமிப்பு - இருமை முறை.

அலகு 3 இணையம்

10 மணி நேரம்

வலைப்பின்னல் (Network) - குறும்பரப்பு வலைப்பின்னல் (LAN Local Area Network) பயன்பாடு - விரிபரப்பு வலைப்பின்னல் (Wa - Wide Area Network) - இணையம் விளக்கம் - வரலாறு - வளர்ச்சி.

அலகு 4 இணையத்தமிழ் இதழ்கள், வலைப்பதிவு

10 மணி நேரம்

இணையத்தமிழ் இதழ்களின் பொதுப்பண்புகள் - இணையத்தமிழ் இதழ்களின் தோற்றம் - வளர்ச்சி நிலைகள் - இணைய இதழ்களின் வகைபாடுகள் - இலக்கியம் - படைப்பு - பல்சுவை - பக்தி - புகலிடம் - சமூகம் - ஆய்வு - மருத்துவம் - அறிவியல் - மகளிர் - தனிமனித கருத்துக்கள் - வலைப்பதிவு சொற்பொருள் விளக்கம் - வலைப்பதிவின் பகுதிகள் - பதிவின் முகப்பு - தலைப்பு - உட்பகுதி - இடுகைகள் சேமிப்பகம் - தொடுப்புகள் - வலைப்பதிவின் பொதுப்பண்புகள் - வலைப்பதிவின் வகைப்பாடுகள்.

அலகு 5 மின்னஞ்சல் உருவாக்க முறைகள்

10 மணி நேரம்

மின்னஞ்சல் (E.Mail) - மின்னஞ்சல் கருவிகள் - அனுப்பும் முறை - மின்னஞ்சலின் பாகங்கள் - மின்னஞ்சல் செயல்படும் முறைகள் - மின்னஞ்சலில் உள்ள வசதிகள்.

பாடநூல்

- பொன்னவைக்கோ, மு. (2003). வளர்தமிழ் அறிவியல். இணையத் தமிழ் அனைத்திந்திய அறிவியல் தமிழ் கழகம். தஞ்சாவூர்.
- இளங்கோவன், மு. (2009). இணையம் கற்போம். வயல் வெளிப் பதிப்பகம். அரியலூர்.

பார்வை நூல்கள்

- மணிகண்டன், துரை. (2008). இணையமும் தமிழும். நல் நிலம் பதிப்பகம். தியாகராய நகர். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	கணினித் தமிழின் தோற்றம் வளர்ச்சியினைப் புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	கணினித்தமிழின் படிநிலைகளைப் பொருத்திப் பார்க்கும் திறனைப் பெறுவர்.	K3
கற்றல் பயன் 3	கணினியில் இணையத்தின் பயன்பாட்டு முறைகளைப் பகுத்தாராய்வார்.	K4
கற்றல் பயன் 4	இணையத்தின் வளர்ச்சிபடிநிலைகளை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	கணினி மற்றும் இணையம் பயன்படுத்தும் முறைகளை அறிந்து பணிவாய்ப்புகளைப் பெறும் திறன் பெறுவர்.	K6

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைத்தர இணைநிலை -

பணி வாய்ப்புத் தமிழ்

UTAD404

பருவம் : நான்காம் பருவம்

பிரிவு : துறைசார் விருப்பாடம் – IV

வகுப்பு : II BA தமிழ்

தரம் : 02

மணிநேரம் / வாரம் : 02

மொத்தமணி நேரம் : 26

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தமிழர் வரலாற்றுச் சிறப்பினையும் தமிழ்மொழியின் பழம் பெருமையினையும் உணர்வர்.
கற்றல் நோக்கம் 2	சங்க இலக்கியம், இலக்கியம், காப்பியம், பக்தி என்று கால வகையிலான அடிப்படையில் இலக்கிய அறிமுகம் - சங்கத்தின் சிறப்பை உணர்த்தி தெரிந்து பழகவும் வாய்ப்புள்ளது).
கற்றல் நோக்கம் 3	தொழில் தொடங்குவதற்கான வாய்ப்புகளை அறிந்து கொள்வர்
கற்றல் நோக்கம் 4	தொடர்ந்து பல்வகையான தமிழ் சான்றோர் தமிழுக்கான பங்களிப்பை செய்த நிலை அறிதல்.
கற்றல் நோக்கம் 5	தம்முடைய வாழ்வை பண்படுத்தி, திறனறித் தேர்வுகளை எதிர்கொள்ளும் ஆற்றல் உடையவராதல்.

அலகு 1 சங்ககாலம்

5 மணி நேரம்

சங்க காலம் சங்கம் - மருவிய காலம்.

அலகு 2 பக்திகாலம்

5 மணி நேரம்

பக்தி இயக்கம் - சமயங்கள் வளர்த்த தமிழ்.

அலகு 3 காப்பிய, சிற்றிலக்கிய காலம்

6 மணி நேரம்

காப்பியங்கள் - புராணங்கள் - இலக்கண நூல்கள் - நிகண்டுகள் - சிற்றிலக்கியங்கள்.

அலகு 4 இக்காலம் - I

5 மணி நேரம்

மரபுக் கவிதை - புதுக்கவிதை - ஹைக்கூ - நாடகம் - புதினம் - சிறுகதை.

அலகு 5 இக்காலம் - II

5 மணி நேரம்

உரைநடை - பத்துறை வளர்ச்சி.

பாடநூல்கள்

- மு வரதராசன். 1972. தமிழ் இலக்கிய வரலாறு. சாகித்ய அகாடமி.

பார்வை நூல்கள்

- தமிழ் அண்ணல். 2022. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. மீனாட்சி புத்தக நிலையம். மதுரை.
- அடைக்கலசாமி. 2000. தமிழ் இலக்கிய வரலாறு. சென்னை.
- சுப்பிரமணியன், ச.வே. 2001. தமிழ் இலக்கிய வரலாறு. மணிவாசகர் பதிப்பகம். சென்னை.
- பாலசுப்பிரமணியம், சிற்பி., பத்மநாபன், நீல.(பதிப்பாசிரியர்), 2013. புதிய தமிழ் இலக்கிய வரலாறு தொகுதி 3 (நவீன இலக்கியம்). சாகித்திய அகாதெமி.
- அழகப்பன், ஆறு. 2011. தமிழ் நாடகத்தின் தோற்றமும் வளர்ச்சியும். பாரி நிலையம். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	தமிழர் வரலாற்றுச் சிறப்பினையும் தமிழ்மொழியின் பழம் பெருமையினையும் உணர்வர்.	K1, K2
கற்றல் பயன் 2	சங்க இலக்கியம், இலக்கியம், காப்பியம், பக்தி என்று கால வகையிலான அடிப்படையில் இலக்கிய அறிமுகம் - சங்கத்தின் சிறப்பை உணர்த்தி தெரிந்து பழகவும் வாய்ப்புள்ளது)	K3
கற்றல் பயன் 3	பழந்தமிழர் வாழ்வுமுறை மற்றும் பண்பாட்டு செய்திகளை குழு விவாதம் மூலம் மாணவியர் அறியச் செய்தலின் மூலம் இலக்கியங்கள் உரைக்கும் வாழ்வியலை நினைவுகூர்ந்து தற்காலத்தோடு ஒப்பிடும் ஆற்றல் பெறுவர்.	K4
கற்றல் பயன் 4	தொடர்ந்து பல்வகையான தமிழ் சான்றோர் தமிழுக்கான பங்களிப்பை செய்த நிலை அறிதல்.	K5
கற்றல் பயன் 5	தம்முடைய வாழ்வை பண்படுத்தி, திறனறித் தேர்வுகளை எதிர்கொள்ளும் ஆற்றல் உடையவராதல்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 87%

இடைநிலை இணைநிலை 13%

குறைதர இணைநிலை -

தமிழும் பொருண்மையியலும்

UTAL309

பருவம் : மூன்றாம் பருவம்

தரம் : 03

பிரிவு : மொழிப்பாடம்

மணிநேரம் / வாரம் : 05

வகுப்பு : II BA தமிழ்

மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	மொழிக்கல்வியில் பொருண்மையின் இன்றியமையாமையை அறிந்து கொள்ள செய்தல்.

கற்றல் நோக்கம் 2	சொல் பொருள் உறவுகளை நுட்பமாக பொருத்திப் பார்க்கும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 3	சொற்பொருள் மாற்ற வரலாற்றைப் பகுத்தாராயும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 4	பொருள் அடிப்படையில் ஆற்றல் வாய்ந்த முறையில் மொழியைக் கையாளும் திறனை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	மொழி சார்ந்த பல்வேறு பணிகளில் பொருண்மையியல் கூறுகளை பொருத்திப் பார்க்கச் செய்தல்.

அலகு 1 பொருண்மை விளக்கம்

12 மணி நேரம்

பொருள் வரையறை – விளக்கம்- சொன்மை – பொருண்மை – பொருண்மையியல் விளக்கம் – வகைகள் – அணுகுமுறைகள் – ஆக்டன் மற்றும் ரிசார்ட் பொருண்மை – முக்கோணம்

அலகு 2 பொருண்மை வகைகள்

15 மணி நேரம்

பன்முனைப் பொருள் – பல பொருள் ஒரு சொல் – ஒரு சொல், போலியியல் – ஒரு பொருள் பன்மொழி – புலன்உறவு – பொருள்மயக்கம் – உருவகம் – ஆகுபெயர்.

அலகு 3 பொருண்மையியல் கோட்பாடுகள்

14 மணி நேரம்

தொல்காப்பியம், சசூர், ஜான் லயன்ஸ், உல்மன், லீச், பூக்கோ, லகான் – மொழி பயன்பாட்டுச் சூழலியல் கோட்பாடுகள்.

அலகு 4 பொருண்மை நிலைகள்

12 மணி நேரம்

சொற்பொருள் மாற்றம் – பொருள் குறுக்கம் – பொருள் விரிவாக்கம் – இடக்கரடக்கல் – மங்கல வழக்கு – அமங்கல வழக்கு – பொருள் அடங்கு சொற்கள் – பொருள் அடக்குச் சொற்கள்.

அலகு 5 இலக்கியத்தில் பொருண்மை

12 மணி நேரம்

இலக்கியத்தில் குறிப்புப் பொருள் – படிமம் – குறியீடு – இறைச்சி – உள்ளுறை – தொனிப்பொருள் – தொன்மங்களின் அடிநிலை கருத்து.

பாடநூல்

சண்முகம்.செ., 1989.பொருண்மையியல். அனைத்திந்திய தமிழ் மொழியியல் கழகம்.

பாடநூல்கள்

- தமிழ் அண்ணல். 2022. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. மீனாட்சி புத்தக நிலையம். மதுரை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	மொழிக்கல்வியில் பொருண்மையின் இன்றியமையாமையை அறிந்து புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	சொல் பொருள் உறவுகளை நுட்பமாக பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	சொற்பொருள் மாற்ற வரலாற்றைப் பகுத்தாராய்வார்.	K4
கற்றல் பயன் 4	பொருள் அடிப்படையில் ஆற்றல் வாய்ந்த முறையில் மொழியைக் கையாளும் திறனை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	மொழி சார்ந்த பல்வேறு பணிகளில் பொருண்மையியல் கூறுகளை பொருத்திக் காண்பர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 87%

இடைநிலை இணைநிலை 13%

குறைதர இணைநிலை -

பொதுத்தமிழ் - III

UTAL310

பருவம் : மூன்றாம் பருவம்

தரம் : 03

பிரிவு : பொதுத்தமிழ் - III

மணிநேரம் / வாரம் : 05

வகுப்பு : II UG

மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	காப்பியம், பக்தி, நவீன இலக்கியங்களின் தோற்றம் வளர்ச்சி நிலைகளைப் புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இலக்கிய வகைமைகளின் படைப்பாக்க உத்தி முறைகளைப் பொருத்திப் பார்க்க செய்தல்.
கற்றல் நோக்கம் 3	இலக்கியங்களில் இடம்பெறும் பாடுபொருட்களின் செல்நெறிகளைப்

	பகுத்தாராயச் செய்தல்.
கற்றல் நோக்கம் 4	இலக்கியங்கள் வெளிப்படுத்தும் நன்னெறிகளை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	இலக்கியங்களின் வழி கண்டறிந்த மெய்ம்மைகளைச் சமூகத்தில் செயல்முறைப்படுத்தும் திறன் பெறுதல்.

அலகு 1 பெருங்காப்பியங்கள்

12 மணி நேரம்

சிலப்பதிகாரம் - வழக்குரைக்காதை - இளங்கோவடிகள் - மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை - சீத்தலைச் சாத்தனார் - சீவகசிந்தாமணி - பூமகள் இலம்பகம் - திருத்தக்க தேவர்.

அலகு 2 சமயக் காப்பியங்கள்

15 மணி நேரம்

பெரியபுராணம் - பூசலார் நாயனார் புராணம் - சேக்கிழார் - கம்பராமாயணம் - குகப்படலம் - கம்பர் - சீறாபுராணம் - புலி வசனத்த படலம் - உமறுப் புலவர் - இயேசு காவியம் - ஊதாரிப் பிள்ளை

அலகு 3 நாடகம்

12 மணி நேரம்

குதிரை முட்டை - சண்முகராஜா

அலகு 4 இலக்கிய வரலாறு

12 மணி நேரம்

பாடம் தழுவிய இலக்கிய வரலாறு

அலகு 5 மொழித்திறன்

14 மணி நேரம்

நூல் மதிப்புரை, கட்டுரை எழுதுதல், விமர்சனம் எழுதுதல், விண்ணப்பம் எழுதுதல்

பாடநூல்கள்

- தமிழ் அண்ணல். 2022. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. மீனாட்சி புத்தக நிலையம். மதுரை.
- பாக்கிய மேரி. 2009. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு. நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.

பார்வை நூல்கள்

- சீனிவாசன், து. 1985. தமிழில் காப்பிய கொள்கை. தமிழ்ப் பல்கலைக்கழகம். தஞ்சாவூர்.
- ஞானசம்பந்தம். அ.ச. 1982. பெரியபுராண ஆராய்ச்சி. தேம்பாவணி. மரிய அந்தோணி. வீரமாமுனிவர் ஆய்வுக் களம். பாளையங்கோட்டை

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	காப்பியம், பக்தி, நவீன இலக்கியங்களின் தோற்றம் வளர்ச்சியினைப் புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	இலக்கிய வகைமைகளின் படைப்பாக்க உத்தி முறைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3

கற்றல் பயன் 3	இலக்கியங்களில் இடம்பெறும் பாடுபொருட்களின் செல்நெறிகளைப் பகுத்தாராய்வர்.	K4
கற்றல் பயன் 4	இலக்கியங்கள் வெளிப்படுத்தும் நன்னெறிகளை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	இலக்கியங்களின் வழி கண்டறிந்த மெய்ம்மைகளைச் சமூகத்தில் செயல்முறைப்படுத்தும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை -

தமிழர் கலைகள்

UTAL409

பருவம் : நான்காம் பருவம்

தரம் : 03

பிரிவு : மொழிப்பாடம்

மணிநேரம் / வாரம் : 05

வகுப்பு : II BA தமிழ்

மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தமிழகக் கலைகளின் அடிப்படைகளை புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	தமிழகக் கலைமரபுகளை அறிந்து கொள்ளச் செய்தல்
கற்றல் நோக்கம் 3	கலைக் கூறுகளை இலக்கியம் பண்பாடு ஆகியவற்றோடு பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 4	கலை நுட்பம் உணர்ந்து அவற்றின் சிறப்பைப் பாராட்டும் தகுதி பெறச் செய்தல்.
கற்றல் நோக்கம் 5	அழிநிலையிலுள்ள கலைகளுக்குப் புத்தாக்கம் தருவதற்கான உந்துதல் பெறச் செய்தல்.

அலகு 1 கலை**12 மணி நேரம்**

கலையும் பண்பாடும் - கலையும் இலக்கியமும் - நுண்கலைகள் - நிகழ்த்துக்கலைகள் - வேத்தியல் -பொதுவியல்

அலகு 2 இசை - நாடகம்**15 மணி நேரம்**

தமிழர் இசை - பண்ணிசை - அரங்கிசை - கீர்த்தனைகள் - திருப்புகழ் - நடனக்கலை - நாட்டிய அடவுகள் - முத்திரைகள் - ஒப்பனைக்கலை - அரங்க அமைப்பு - இசைக்கருவிகள் - தோற்கருவி - துளைக்கருவி - கஞ்சக்கருவி - மிடற்றுக்கருவி - நாடகக்கலை - கூத்து - மேடை - மூன்றாம் அரங்கம்.

அலகு 3 ஓவியம் இன்னபிற**14 மணி நேரம்**

ஓவியக்கலை - வண்ணக் கலவை - சிற்பக்கலை - வழிபாட்டுச் சிற்பங்கள் - பொதுச் சிற்பங்கள் - கற்சிற்பங்கள் - உலோகச் சிற்பங்கள் - மரச் சிற்பங்கள் - மருத்துவக்கலை - கைவினைப்பொருட்கள் - நாட்டுப்புறக் கலைகள்.

அலகு 4 கட்டிடக்கலை**12 மணி நேரம்**

கட்டிடப்பொருட்கள் - வீடு, இல்லம், கோயில், கட்டிடங்கள் - ஆகமங்கள் உடல் அமைப்பும் கோயில் கட்டிட அமைப்பும்

அலகு 5 கைவினை**12 மணி நேரம்**

கைவினைப்பொருட்கள் - புவிசார் குறியீடு பெற்ற தமிழகக் கலைப்பொருட்கள் - புழங்கு பொருட்கள் - புழங்குபொருள் கலை - கலைஞர்கள் - கலைஞர்களின் வாழ்வியல்.

பாடநூல்

- வேங்கடசாமி. மயிலை சீனி., தமிழர் வளர்த்த அழகுக் கலைகள்.

பார்வை நூல்கள்

- பாக்கிய மேரி. 2009. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு.நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	தமிழகக் கலைகளின் அடிப்படைகளை புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	தமிழகக் கலைமரபுகளை அறிந்து கொள்வர்	K3
கற்றல் பயன் 3	கலைக் கூறுகளை இலக்கியம் பண்பாடு ஆகியவற்றோடு பொருத்திப் பார்ப்பர்.	K4
கற்றல் பயன் 4	கலை நுட்பம் உணர்ந்து அவற்றின் சிறப்பைப் பாராட்டும்	K5

	தகுதி பெறுவர்.	
கற்றல் பயன் 5	அழிநிலையிலுள்ள கலைகளுக்குப் புத்தாக்கம் தருவதற்கான உந்துதல் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை -

பொதுத்தமிழ் - IV

UTAL410

பருவம் : நான்காம் பருவம்

தரம் : 03

பிரிவு : பொதுத்தமிழ் - IV

மணிநேரம் / வாரம் : 05

வகுப்பு : II UG

மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	சங்கம் மற்றும் நவீன இலக்கியங்களின் தோற்றம் வளர்ச்சி நிலைகளைப் புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இலக்கிய வகைமைகளின் படைப்பாக்க உத்தி முறைகளைப் பொருத்திப் பார்க்க செய்தல்.
கற்றல் நோக்கம் 3	பாடுபொருட்களின் செல்நெறிகளைப் பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	இலக்கியங்கள் வெளிப்படுத்தும் நன்னெறிகளை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	இலக்கியங்களின் வழி கண்டறிந்த மெய்மைகளைச் சமூகத்தில் செயல்முறைப்படுத்தும் திறன் பெறுதல்.

அலகு 1 சங்கம் - I

12 மணி நேரம்

எட்டுத்தொகை - நற்றிணை (10,14,16), குறுந்தொகை (16,17,19,20,25,29,38,44) கலித்தொகை (38,51) அகநானூறு (15,33,55) புறநானூறு (37,86,112) பரிபாடல்-55

அலகு 2 சங்கம் - II

15 மணி நேரம்

எட்டுத்தொகை - நெடுநல்வாடை - நக்கீரர்

அலகு 3 கட்டுரை**12 மணி நேரம்**

கி.பார்த்திபராஜா - தமிழ்க் கலை மணிகள்

அலகு 4 இலக்கிய வரலாறு**14 மணி நேரம்**

பாடம் தழுவிய இலக்கிய வரலாறு

அலகு 5 மொழித்திறன்**12 மணி நேரம்**

மொழிபெயர்ப்பு - கலைச்சொற்கள் - ஆங்கிலப் பகுதியை தமிழில் மொழிபெயர்த்தல் - அலுவலகக்கடிதம் - தமிழில் மொழி பெயர்த்தல்.

பாடநூல்கள்

- தமிழ் அண்ணல். 2022. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு. மீனாட்சி புத்தக நிலையம். மதுரை.
- பார்த்திபராஜா,கி. (2022). தமிழ் கலை மணிகள். பாரதி புத்தகாலயம். மதுரை.

பார்வை நூல்கள்

- பாக்கிய மேரி. 2009. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு.நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.
- சீனிவாசன், து. 1985. தமிழில் காப்பிய கொள்கை. தமிழ்ப் பல்கலைக்கழகம். தஞ்சாவூர்.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	சங்கம் மற்றும் நவீன இலக்கியங்களின் தோற்றம் வளர்ச்சி நிலைகளைப் புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	இலக்கிய வகைமைகளின் படைப்பாக்க உத்தி முறைகளைப் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	பாடுபொருட்களின் செல்நெறிகளைப் பகுத்தாராய்வார்.	K4
கற்றல் பயன் 4	இலக்கியங்கள் வெளிப்படுத்தும் நன்னெறிகளை மதிப்பிடுவர்.	K5
கற்றல் பயன் 5	இலக்கியங்களின் வழி கண்டறிந்த மெய்ம்மைகளைச் சமூகத்தில் செயல்முறைப்படுத்தும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை -

அகமதிப்பீட்டிற்கான III ஆம் மற்றும் IV ஆம் உட்கூறுகள்

பருவம்	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	I உட்கூறுகள்	II உட்கூறுகள்
III	தமிழ் - III	UTAL309/ UTAL310	தமிழும் பொருண்மையிலும்/ பொதுத்தமிழ் - III	கருத்தரங்கம்	நூல் பட்டியல் தயாரித்தல்
	முதன்மைப்பாடம் - IV	UTAM307	காப்பிய இலக்கியங்கள்	கருத்தரங்கம்	அட்டவணை தயாரித்தல்
	முதன்மைப்பாடம் - VI	UTAM308	நன்னூல் - எழுத்து	இலக்கண குறிப்பு தயாரித்தல்	இலக்கண சொல்லாக்கம்
	சார்புப்பாடம் - III (துறை சார்ந்தது)	UTAO307	சித்தர் இலக்கியமும் சித்த மருத்துவமும்	கருத்தரங்கம்	மூலிகை பயிற்சி
	துறைசார் விருப்பப்பாடம் - II	UTAD301	பெண்ணியமும் இலக்கியமும்	விளக்க அட்டை	இலக்கிய அட்டவணை
	துறைசார் விருப்பப்பாடம் - III	UTAE302	தொழில் முனைவுத்தமிழ்	அட்டவணை	கள ஆய்வு
IV	தமிழ் - IV	UTAL409/ UTAL410	தமிழர் கலைகள்/ பொதுத்தமிழ் - IV	கருத்தரங்கம்	அட்டவணை
	முதன்மைப்பாடம் - VII	UTAM406	பக்தி இலக்கியம்	கருத்தரங்கம்	தலவரிசை கையேடு
	முதன்மைப்பாடம் - VIII	UTAM407	நன்னூல் - சொல்	இலக்கண சுவடி தயாரித்தல்	ஆய்வடங்கல்
	சார்புப்பாடம் - IV	UTAO405	கணினியும் இணையமும்	மாதிரி உருவாக்கம்	இணையச் செயல்பாடுகள் விளக்கப்படம்
	துறைசார் விருப்பப்பாடம்- IV	UTAD404	பணிவாய்ப்புத் தமிழ்	அட்டவணை	கால வரிசையில் கோப்பு தயாரித்தல்

தமிழாய்வுத்துறை முதுகலை தமிழ்

முகவுரை

நான்கு பருவங்களுக்குரிய பாடத்திட்ட வடிவமைப்பு இடம்பெற்றுள்ளது. மூன்று மற்றும் நான்காம் பருவத்திற்குரிய பாடத்திட்டம் மற்றும் அகமதிப்பீட்டுக் கூறுகள் இடம்பெற்றுள்ளன. இப்பாடத்திட்டமானது 2023 - 2025ஆம் கல்வியாண்டுகளில் பயிலும் மாணவியர்களுக்கு உரியது.

பாடத்திட்ட அமைப்பு : முதுகலை தமிழ் (M.A)

பாடத்திட்டப் பயன்கள்

- PSO – 1 தமிழ் இலக்கியம் மற்றும் இலக்கணக் கொள்கைகளை அறிந்து கொள்வர்.
- PSO – 2 தமிழர் வரலாறு மற்றும் பண்பாட்டினைக் கோட்பாடுகள் அடிப்படையில் புரிந்து கொள்வர்.
- PSO – 3 இலக்கியம் வழி கண்டறிந்த வாழ்வியல் நெறிகளைச் சமுதாயத்தில் நடைமுறைப்படுத்தும் அல்லது பொருத்திப்பார்க்கும் திறனைப் பெறுவர்.
- PSO – 4 தமிழியல் கூறுகின்ற மெய்மைகளைக் காரண காரிய அடிப்படையில் பகுத்தாய்வர்.
- PSO – 5 தமிழ் இலக்கியம் முன்மொழிகின்ற செந்நெறிகளை மதிப்பிட்டு ஆராயும் திறன் பெறுவர்.
- PSO – 6 தமிழ் இலக்கிய வகைமைகளைக் கற்றுத்தெளிந்து புத்திலக்கியங்களைப் படைக்கும் திறன் மற்றும் பணி வாய்ப்பினைப் பெறும் திறன் பெறுவர்.

பருவம்	வகை	பாடக் குறியீடு	பாடத் தலைப்பு	வாரம் மணி நேரம்	தரம்
I	முதன்மைப்பாடம் - I	PTAM112	இக்கால இலக்கியம்	5	4
	முதன்மைப்பாடம் - II	PTAM113	அறஇலக்கியம்	5	4
	முதன்மைப்பாடம் - III	PTAM114	தொல்காப்பியம் – பொருளதிகாரம்	5	4
	சார்புப்பாடம் - I	PTAA101	தமிழ் அழகியல்	5	3
	சார்புப்பாடம்- II	PTAA102	செம்மொழித் தமிழ்	5	3
	துறைசாரா விருப்பப்பாடம் - I			3	2
	இணையப்பாடம்			2	2
மொத்தம்				30	22
II	முதன்மைப்பாடம்- IV	PTAM214	பக்தி இலக்கியம்	5	4
	முதன்மைப்பாடம் - V	PTAM215	காப்பிய இலக்கியம்	5	4
	முதன்மைப்பாடம் - VI	PTAM216	தொல்காப்பியம் பொருளதிகாரம்	5	4
	தொழில்சார் பாடம்	PTAM217	திரைப்படக்கலை	4	3
	சார்புப்பாடம் - III (துறை சார்ந்தது)	PTAO201	சுவடியியல்	4	3
	சார்புப்பாடம்- IV (மரபு சார்ந்தது)	PTAO202	நோக்கு நூல்கள்	4	3

	திறன்சார் பாடம்	PTAD201	பண்பாட்டு மானுடவியல்	3	2
	கல்வியிடைப் பயிற்சி				2
	கற்றல் சேவை திறம்				1
மொத்தம்				30	26
III	முதன்மைப்பாடம் - VII	PTAM311	சிற்றிலக்கியம்	5	4
	முதன்மைப்பாடம் - VIII	PTAM312	தொல்காப்பியம் - எழுத்து	5	4
	முதன்மைப்பாடம் - IX	PTAM313	ஆராய்ச்சி நெறியியல்	5	4
	தொழில்சார் பாடம்	PTAM314	பேச்சுக்கலை	4	3
	சார்புப்பாடம்- V (துறை சார்ந்தது)	PTAO301	படைப்புத்திறன்	3	3
	சார்புப்பாடம்- VI (மரபு சார்ந்தது)	PTAO302	ஒப்பிலக்கிய நெறிகள்	4	3
	துறையிடைப்பாடம்	PTAI301	குறுங்கவிதை வடிவங்கள்	4	2
மொத்தம்				30	23
IV	முதன்மைப்பாடம் - X	PTAM412	சங்க இலக்கியங்கள்	5	4
	முதன்மைப்பாடம் - XI	PTAM413	தொல்காப்பியம் - சொல்லதிகாரம்	5	4
	முதன்மைப்பாடம் - XII	PTAM414	இணையமும் தமிழும்	5	4
	சார்புப்பாடம் - VII (துறை சார்ந்தது)	PTAO401	நாடகவியல்	5	3
	ஆய்வு	PTAP402	ஆய்வேடு	6	4
	பணிச்சார் திறன் பாடம்	PTAC401	பதிப்பியல்	4	2
	கல்வியிடைப்பயிற்சி				-/2
மொத்தம்				30	21/23
கூட்டு எண்ணிக்கை				120	92/94

சிற்றிலக்கியம்

PTAM311

பருவம் : மூன்றாம் பருவம்
பிரிவு : முதன்மைப்பாடம் – VII
வகுப்பு : II MA தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	சிற்றிலக்கியத்தின் தோற்றம் வளர்ச்சியினைப் புரிந்து கொள்ளச் செய்தல்
கற்றல் நோக்கம் 2	சிற்றிலக்கியத்தின் வகைமைகளைப் பொருத்திப்பார்க்கும் திறன் பெறச் செய்தல்
கற்றல் நோக்கம் 3	சிற்றிலக்கியத்தின் படைப்பாக்க உத்தி முறைகள் குறித்து பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	சிற்றிலக்கியத்தின் பொருண்மைகளை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	சிற்றிலக்கியத்தில் விவரித்துள்ள சமூகம் சார்ந்த கற்பிதங்களை உணர்ந்து சமூகத்தில் நடத்தல் மற்றும் இலக்கியம் படைக்கும் திறன் பெறச்செய்தல்.

அலகு 1 சிற்றிலக்கியங்கள் அறிமுகம்

12 மணி நேரம்

சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும் - பரணி, தூது, குறவஞ்சி, பள்ளு, கலம்பகம், பிள்ளைத்தமிழ், அந்தாதி, காவடி சிந்து, முத்தொள்ளாயிரம் குறித்த அறிமுகம். பாட்டியல் நூல்களும் பிரபந்த இலக்கியமும் குறித்த அறிமுகம் பொது அறிமுகம்.

அலகு 2 தூது

15 மணி நேரம்

தமிழ்விடுதூது – தமிழ்விடுதூது முழுமையும்

அலகு 3 குறவஞ்சி

12 மணி நேரம்

குற்றால குறவஞ்சி (சிங்கன் சிங்கி உரையாடல் நீங்கலாக)

அலகு 4 பள்ளு

12 மணி நேரம்

முக்கூடற்பள்ளு - முக்கூடற்பள்ளு – முழுமையும்

அலகு 5 கலம்பகம், அந்தாதி, சிந்து, தொள்ளாயிரம்

14 மணி நேரம்

மதுரைகலம்பகம், திருச்செந்தூர் பிள்ளைத்தமிழ், அபிராமி அந்தாதி, அண்ணாமலை ரெட்டியார் காவடி சிந்து, முத்தொள்ளாயிரம் (அலகு 5 இல் அனைத்து இலக்கியங்களிலும் முதல் 5 பாடல்கள் மட்டும்)

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- செளந்தரபாண்டியன், எஸ். (1989). தமிழில் பிள்ளைத்தமிழ் இலக்கியம். ஸ்டார் பிரசுரம். சென்னை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	சிற்றிலக்கியத்தின் தோற்றம் வளர்ச்சியினைப் புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	சிற்றிலக்கியத்தின் வகைமைகளைப் பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	சிற்றிலக்கியத்தின் படைப்பாக்க உத்தி முறைகள் குறித்து பகுத்தாராயும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	சிற்றிலக்கியத்தின் பொருண்மைகளை மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	சிற்றிலக்கியத்தில் விவரித்துள்ள சமூகம் சார்ந்த கற்பிதங்களை உணர்ந்து சமூகத்தில் நடத்தல் மற்றும் இலக்கியத்தினைப் படைக்கும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 87%

இடைநிலை இணைநிலை 13%

குறைதர இணைநிலை -

தொல்காப்பியம் - எழுத்து

PTAM312

பருவம் : மூன்றாம் பருவம்
பிரிவு : முதன்மைப்பாடம் – VIII
வகுப்பு : I MA தமிழ்

தரம் : 04
மணிநேரம்/வாரம் : 05
மொத்த மணிநேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	தொல்காப்பியத்தில் எழுத்ததிகாரத்தின் அமைப்பு நிலை குறித்து அறிந்துகொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	எழுத்து இலக்கணமரபுகளின் நுணுக்கங்களைப் புரியச் செய்தல்
கற்றல் நோக்கம் 3	மொழியினை பயன்படுத்தும் திறம் குறித்து மதிப்பிடச் செய்தல்
கற்றல் நோக்கம் 4	தமிழ் எழுத்துக்கள் பிறக்கும் விதம் மற்றும் உச்சரிக்கும் விதம் குறித்து பகுப்பாய்வுச்செய்தல்.
கற்றல் நோக்கம் 5	புணர்ச்சி விதிகளின் தன்மைகளை உணர்ந்து எழுத்துக்களைப் பிழையின்றி பேசவும் எழுதுவதற்குமான திறனைப் பெறச்செய்தல்.

அலகு 1

12 மணி நேரம்

நூன் மரபு - மொழி மரபு

அலகு 2

15 மணி நேரம்

பிறப்பியல் – தொகை மரபு

அலகு 3

12 மணி நேரம்

புணரியல் - உருபியல்

அலகு 4

12 மணி நேரம்

உயிர் மயங்கியல் - புள்ளி மயங்கியல்

அலகு 5

14 மணி நேரம்

குற்றியலுகரப் புணரியல்

பாடநூல்

- தொல்காப்பியம் எழுத்ததிகாரம். (2003). (இளம்பூரணர் உரை). தமிழ் மண் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

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வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	எழுத்ததிகாரத்தில் உள்ள இயல்களின் சிறப்புத்தன்மைகளை அறிந்து தெளிவர்.	K1, K2
கற்றல் பயன் 2	எழுத்திலக்கண இலக்கண மரபுகளை உணர்ந்து புரிந்து கொள்வர்.	K3
கற்றல் பயன் 3	மொழியினை பயன்படுத்தும் திறம் குறித்து மதிப்பிடும் திறனைப் பெறுவர்.	K4
கற்றல் பயன் 4	எழுத்துக்களின் தோற்றம், புணர்ச்சி விதிகள் பற்றி பகுப்பாய்வுச் செய்வர்.	K5
கற்றல் பயன் 5	எழுத்துக்களைக்கொண்டு புதிய சொற்களை கட்டமைக்கும் திறனை பெறுவதுடன், பிழைத்திருத்தம் செய்யும் ஆற்றல் பெற்று பிழைத்திருத்துனர் பணிவாய்ப்பினை பெறுவர்.	K6

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 70%

இடைநிலை இணைநிலை 30%

குறைதர இணைநிலை -

ஆராய்ச்சி நெறியியல்

PTAM313

பருவம் : மூன்றாம் பருவம்
பிரிவு : முதன்மைப்பாடம் - IX
வகுப்பு : I MA தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	ஆராய்ச்சி குறித்த விளக்கம் மற்றும் வகைமைகள் குறித்து புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இலக்கிய வகைமைகளை ஆய்வுக்கு பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	ஆய்விற்குரிய கருதுகோள், ஆய்வுச்சிக்கல், ஆய்வு மூலங்கள் குறித்து பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	ஆராய்ச்சிக்குரிய தமிழாய்வுக் களங்களை மதிப்பிடும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 5	ஆராய்ச்சி நெறிமுறைகளை நன்கு கற்றுணர்ந்து அனுபவரீதியாக ஆய்வேட்டினைக் கட்டமைக்கும் திறன் பெறச்செய்தல்.

அலகு 1 ஆய்வு

12 மணி நேரம்

ஆய்வு விளக்கம் - தத்துவம் - கலை - அறிவியல் - ஆய்வுலக நாகரிகம் - உரையாசிரியர்கள் கண்ட ஆய்வு முறை

அலகு 2 ஆய்வு வளர்ச்சி நிலைகள்

15 மணி நேரம்

ஆய்வு மொழி நடை - வரலாற்று நோக்கில் ஆய்வு வளர்ச்சி - ஆய்வு வளர்ச்சியும் ஆய்வுத்துறைகளும் - ஆய்வியலில் சில அடிப்படைக் கோட்பாடுகள்

அலகு 3 ஆய்வு முறைகள்

12 மணி நேரம்

உத்திகள் - நோக்குகள் அல்லது அணுகுமுறைகள் - தகவல் திரட்டல் - கள ஆய்வு - அடிக்குறிப்பு - ஆய்வு வகைகள் - முன்னாய்வுக்களங்கள்.

அலகு 4 ஆய்வு அமைப்பு

12 மணி நேரம்

மேற்கோளாட்சி - படங்களும் அட்டவணைகளும் - உசாத்துணைக் குறிப்பு- பின்னிணைப்பு - ஆய்வு திட்டங்கள் - ஆய்வேடு அமைப்பு - நூலும் ஆய்வேடும்.

அலகு 5 தமிழாய்வு பரப்பு

14 மணி நேரம்

தமிழியலும் பிற துறைகளும் - ஆய்வுலகில் தமிழியல் - சமுதாய முன்னேற்றத்தில் ஆய்வின் பங்கு - ஆய்வுச் சமுதாயம் - இணைப்புகள்.

பாடநூல்கள்

- பொற்கோ. (2011). ஆராய்ச்சி நெறிமுறைகள். ஐந்திணைப் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- தமிழண்ணல், மா. இலக்குமணன். 1997. ஆய்வியல் அறிமுகம். செல்லப்பா பதிப்பகம். மயூரா வளாகம். மதுரை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	ஆராய்ச்சி குறித்த விளக்கம் மற்றும் வகைமைகள் குறித்து புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன் 2	இலக்கிய வகைமைகளை ஆய்வுக்கு பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	ஆய்விற்குரிய கருதுகோள், ஆய்வுச்சிக்கல், ஆய்வு மூலங்கள் குறித்து பகுத்தாராய்வர்.	K4
கற்றல் பயன் 4	ஆராய்ச்சிக்குரிய தமிழாய்வுக் களங்களை மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	ஆராய்ச்சி நெறிமுறைகளை நன்கு கற்றுணர்ந்து அனுபவரீதியாக ஆய்வேட்டினை கட்டமைக்கும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 83%

இடைநிலை இணைநிலை 17%

குறைதர இணைநிலை -

பேச்சுக்கலை
PTAM314

பருவம் : மூன்றாம் பருவம்
பிரிவு : தொழில்சார்ப் பாடம்
வகுப்பு : II M.A. தமிழ்

தரம் : 03
மணிநேரம் / வாரம் : 04
மொத்தமணி நேரம் : 52

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	பேச்சுக்கலையின் வரலாறு, இயல்புகள் குறித்து புரிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம் 2	பேச்சுக்கலையினால் விளையும் நன்மை, தீமைகளைப் பொருத்திப் பார்க்கச் செய்தல்.
கற்றலின் நோக்கம் 3	பேச்சுக்கலையின் நெறிகளையும், பேச்சுக்கலையின் விதிமுறைகளையும் அறிந்து, விமர்சனத்தின் அடிப்படையில் பகுத்தாராய்ச் செய்தல்.
கற்றலின் நோக்கம் 4	பேச்சின் அறங்களை அறிந்து கொண்டு, இன்றைய விளம்பரங்களின் போக்குகளை மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் 5	பேச்சின் உத்திகளை அறிந்து கொண்டு, இக்கால தொழில்துறைகளில் புகுத்தி பணி வாய்ப்பினைப் பெறும் திறன் பெற செய்தல்.

அலகு I பேச்சாளர்குரிய தகுதிகள்

12 மணி நேரம்

பேச்சாளன் தகுதிகள் - முன்னோடிகள் - இலக்கிய அடிப்படை - அனுபவம் - தனித்தன்மை - முயற்சிகள்.

அலகு II பல்வகை உரைகள்

10 மணி நேரம்

பல்வகை உரைகள் - நாட்டுப்புறவியல் - செய்திகள் - மன்றங்கள் - இலக்கியநடை-
அவையறிதல்- வருணனைகள் - இணைப்புரைகள்

அலகு III பேச்சுகளின் வகைகள்

10 மணி நேரம்

சிந்தனை பேச்சு - நன்மைகள் - சிலேடைகள் - நெகிழ்வுப்பேச்சு ஆற்றல்கள் சங்கங்கள்.

அலகு IV பயிற்சி அளித்தல்

10 மணி நேரம்

பயிற்சி அளித்தல் - பேச்சுப் பயிலரங்கங்கள் - மொழிபெயர்ப்பு பயிற்சி அளித்தல்

அலகு V பயிற்சி அளித்தல்

10 மணி நேரம்

கலந்துரையாடல் - நேர்காணல் - பேச்சுக்கலையியல் கடைபிடிக்க வேண்டியவை

பாடநூல்கள்

- ஞானசம்பந்தன், கு . (2011). பேசும் கலை. நியூ செஞ்சரி புக் ஹவுஸ். சென்னை.

பார்வை நூல்கள்

- பரமனாந்தம், அ.மு. (2011). பேச்சாளராக. வானதி பதிப்பகம். சென்னை.
- குமரி ஆனந்தன். (2011). நீங்களும் பேச்சாளராகலாம். பாவை பதிப்பகம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	பேச்சுக்கலையின் வரலாறு, இயல்புகள் குறித்து புரிந்து கொள்வர்.	K1, K2
கற்றலின் பயன்கள் 2	பேச்சுக்கலையினால் விளையும் நன்மை, தீமைகளைப் பொருத்திப் பார்க்கும் திறம் பெறுவர்.	K3
கற்றலின் பயன்கள் 3	பேச்சுக்கலையின் நெறிகளையும், பேச்சுக்கலையின் விதிமுறைகளையும் அறிந்து, விமர்சனத்தின் அடிப்படையில் பகுப்பாய்வு செய்யும் ஆற்றல் பெறுவர்.	K4
கற்றலின் பயன்கள் 4	பேச்சுக்கலை அறங்களை அறிந்து கொண்டு, இன்றைய விளம்பரங்களின் போக்குகளை மதிப்பிட்டு அறியும் திறன் பெறுவர்.	K5
கற்றலின் பயன்கள் 5	பேச்சுக்களின் உத்திகளை அறிந்து கொண்டு, இக்கால தொழில்துறைகளில் புகுத்தி பணி வாய்ப்பினைப் பெறும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	2	3	3	3	3	2

உயர்தர இணை நிலை 97%

இடைநிலை இணைநிலை 03%

குறைதர இணைநிலை -

படைப்புத்திறன்

PTAO301

பருவம் : மூன்றாம் பருவம்

தரம் : 03

பிரிவு : சார்புப்பாடம் - V

மணிநேரம் / வாரம் : 03

வகுப்பு : II M.A. தமிழ்

மொத்தமணி நேரம் : 39

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	படைப்பிலக்கிய வகைமைகளின் தோற்றம் வளர்ச்சி படிநிலைகளைப் புரிந்துக் கொள்ளச்செய்தல்.
கற்றல் நோக்கம் 2	படைப்பிலக்கியத்தின் பாடுபொருட்கள் குறித்து பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	படைப்பிலக்கிய படைப்பாக்க உத்திகள் குறித்து பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	படைப்புக்களின் பொருண்மைகளை மதிப்பிடும் திறன் பெறச்செய்தல்.

கற்றல் நோக்கம் 5	கவிதை, கதை, நாடகம் ஆகியவற்றினை முழுமையாக அறிந்து சமூக வளர்ச்சிக்காகவும், தங்களுடைய பணி வாய்ப்பிற்காகவும் படைப்பிலக்கியங்களை பயன் படுத்தும் திறன் பெறச்செய்தல்.
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அலகு 1 கவிதை

08 மணி நேரம்

மரபுக் கவிதை, புதுக்கவிதை, ஹைக்கூ கவிதை எழுதுதல் - கொடுக்கப்பட்ட தலைப்பு அல்லது குறிப்பிட்ட பொருள் குறித்து கவிதை எழுதுதல்.

அலகு 2 சிறுகதை

08 மணி நேரம்

கதையின் பாடுபொருள் - சமூக விழிப்புணர்வுகள் முதலான குறிப்பிட்ட பொருளை மையமாகக் கொண்டு சிறுகதை எழுதுதல் - குறுங்கதை படைத்தல்.

அலகு 3 நாடகம்

08 மணி நேரம்

ஓரங்க நாடகம் எழுதுதல் - வரலாற்று நாடகம் - இதிகாச நாடகம் - நகைச்சுவை நாடகம் - காப்பியக் கூறுகளை அடிப்படையாகக் கொண்டு நாடகம் படைத்தல்.

அலகு 4 கட்டுரை

08 மணி நேரம்

கட்டுரை எழுதுதல் - இலக்கிய கட்டுரை - வரலாற்றுக் கட்டுரை - சமூக விழிப்புணர்வு கட்டுரை - தலையங்கக் கட்டுரை - பயண கட்டுரை - ஆன்மிக கட்டுரை படைத்தல்.

அலகு 5 திறன் வெளிப்பாடு

07 மணி நேரம்

நூல் மதிப்பீடு செய்தல் - இலக்கியங்கள் - ஆய்வு நூல்கள் - இதழ்கள் - திரைப்படங்கள் - மின் ஊடகங்கள் - மதிப்பீடுகள் - களப்பணி - செய்தி சேகரித்தல் - வெளியிடுதல் - பேட்டி காணல்.

பாட நூல்கள்

- மணவாளன், அ.சு. (2001). அரிஸ்டாட்டிலின் கவிதை இயல். நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.

பார்வை நூல்கள்

- பரந்தாமனார், அ.கி. (2000). கவிஞராக அல்லி நிலையம். சென்னை.
- பரந்தாமனார், ஆ.கி. (2019). நல்ல தமிழ் எழுத வேண்டுமா. மலர் நிலையம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	படைப்பிலக்கிய வகைமைகளின் தோற்றம் வளர்ச்சி படிநிலைகளைப் புரிந்துக்கொள்வர்	K1, K2
கற்றலின் பயன்கள் 2	படைப்பிலக்கியத்தின் பாடுபொருட்கள் குறித்து பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றலின் பயன்கள் 3	படைப்பிலக்கிய படைப்பாக்க உத்திகள் குறித்து பகுத்தாராய்வர்.	K4

கற்றலின் பயன்கள் 4	படைப்புக்களின் பொருண்மைகளை மதிப்பிடுவர்.	K5
கற்றலின் பயன்கள் 5	படைப்பிலக்கிய வகைமைகளான கவிதை, கதை, நாடகம் ஆகியவற்றினை முழுமையாக அறிந்து சமூக வளர்ச்சிக்காகவும், தங்களுடைய பணி வாய்ப்பிற்காகவும் படைப்பிலக்கியங்களை பயன்படுத்தும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	2	2
CO 5	2	3	3	3	3	2

உயர்தர இணை நிலை 90%

இடைநிலை இணைநிலை 10%

குறைதர இணைநிலை -

ஒப்பிலக்கிய நெறிகள்

PTAO302

பருவம் : மூன்றாம் பருவம்

தரம் : 03

பிரிவு : சார்புப்பாடம் - VI

மணிநேரம் / வாரம் : 04

வகுப்பு : II M.A. தமிழ்

மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	ஒப்பிலக்கியத்தின் தோற்றம் வளர்ச்சி படிநிலைகளை புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	ஒப்பிலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	ஒப்பிலக்கியத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 4	ஒப்பிலக்கியத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 5	ஒப்பிலக்கியத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறன் பெறச் செய்தல்.

அலகு 1 ஒப்பிலக்கியம் அறிமுகம் விளக்கமும்**12 மணி நேரம்**

ஒப்பிலக்கியம் - வரையறை - விளக்கம், ஒப்பிலக்கிய வரலாறு, தேசிய இலக்கியம் - பொது இலக்கியம் - உலக இலக்கியம், ஒப்பிலக்கிய கல்வியின் பயன்கள், தமிழில் ஒப்பிலக்கிய ஆய்வுகள்.

அலகு 2 தாக்க ஆய்வு**10 மணி நேரம்**

தாக்க ஆய்வு - இலக்கியத் தாக்கமும் படைப்பாற்றலும் - இலக்கிய செல்வாக்கும் ஏற்றுக் கொள்ளலும் - பெறுதலும் செய்தி தொடர்பும் - தாக்கம் பற்றிய ஆய்வு - தாக்கமும் போலச் செய்தலும் - தாக்கமும் ஒப்புமையும்.

அலகு 3 இலக்கிய வகைமை, காலப்பகுதி, இயக்கங்கள்**10 மணி நேரம்**

வகைமைகளும் ஒப்பிலக்கியங்களும் - பகைமை ஆய்வுகள் - தமிழில் வகைமைக் கொள்கையும் வகைமைகளும் - மேனாட்டு வகைமைக் கோட்பாடுகள் - காலப் பகுதிகளும் இயக்கங்களும்

அலகு 4 அடி கருத்தியல், மொழிபெயர்ப்பு**10 மணி நேரம்**

அடி கருத்தியலில் அடிப்படை - அடி கருத்து, வடிவம், உள்ளீடு, பொருள் - அடி கருத்தும் குறிப்பொருளும், மொழிபெயர்ப்புக்கலை - மொழிபெயர்ப்பு வகைகள் - தியோடோர் சேவரியின் வகைப்பாடு - கோட்பாடுகளும் பயிற்சியும்.

அலகு 5 ஒப்பிலக்கியம்: உளவியல், சமூகவியல்**10 மணி நேரம்**

இலக்கியமும் உளவியலும் - இலக்கியமும் சமூகவியலும்.

பார்வை நூல்கள்

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வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	ஒப்பிலக்கியத்தின் தோற்றம் வளர்ச்சி படிநிலைகளைப் புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	ஒப்பிலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	ஒப்பிலக்கியத்தின் படிநிலைகளைப் பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	ஒப்பிலக்கியத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	ஒப்பிலக்கியத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 70%

இடைநிலை இணைநிலை 30%

குறைதர இணைநிலை -

குறுங்கவிதை வடிவங்கள்

PTAI301

பருவம் : மூன்றாம் பருவம்
பிரிவு : துறையிடைப் பாடம்
வகுப்பு : II M.A. தமிழ்

தரம் : 02
மணிநேரம் / வாரம் : 04
மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	குறுங்கவிதைகள் குறித்து புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	குறுங்கவிதைகளின் வகைமைகளை பொருத்திப்பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	குறுங்கவிதைகளின் பாடுபொருள், உத்திமுறைகளைப் பகுத்தாராய்ச் செய்தல்.
கற்றல் நோக்கம் 4	சமுதாயத்தினை குறுங்கவிதைகள் பதிவுச்செய்யும் நிலைக்குறித்து மதிப்பிடச்செய்தல்
கற்றல் நோக்கம் 5	குறுங்கவிதைகளின் தனித்துவங்கள், படைக்கும் முறைகள் குறித்து முழுமையாக அறிந்து படைக்கும் திறன் பெறச்செய்தல்.

அலகு 1 குறுங்கவிதைகள் அறிமுகம் 12 மணி நேரம்
தமிழ், ஆங்கில கவிதை வடிவங்கள் - செய்யுள் - புதுக்கவிதை - குறுங்கவிதைகள் - அடிவரையறை - பாடுபொருள் - படைப்பு உத்திகள்.

அலகு 2 ஹைக்கூ 10 மணி நேரம்
சப்பானில் ஹைக்கூ - ஹைக்கூவின் வளர்ச்சி - ஹைக்கூவின் மூலவர்கள்- தமிழ் மற்றும் ஆங்கிலத்தில் ஹைக்கூ - ஜென் தத்துவம் - ஹைக்கூவின் படைப்பு முறைகள் - கைக்கூவின் பாடுபொருள்கள்.

அலகு 3 சென்ரியு 10 மணி நேரம்
சப்பானில் சென்ரியு - சென்ரியுவின் வளர்ச்சி - காரை சென்ரியு - சென்ரியு பெயர் காரணம் - தமிழ் மற்றும் ஆங்கிலத்தில் சென்ரியு - சென்ரியு படைப்பு முறைகள் - சென்ரியுவின் பாடுபொருள்கள்.

அலகு 4 லிமரைக்கூ 10 மணி நேரம்
லிமரிக் - லிமரிக் தனித்தன்மைகள் - லிமரைக்கூ தோற்றம் - லிமரைக்கூ வளர்ச்சி நிலைகள் - தமிழ் மற்றும் ஆங்கிலத்தில் லிமரைக்கூ - தோற்ற நிலைகள் - வளர்ச்சிநிலைகள் - ஹைக்கூவின் படைப்பு முறைகள் - ஹைக்கூவின் பாடுபொருள்கள்.

அலகு 5 பயிற்சி 10 மணி நேரம்
கருத்து, உணர்ச்சி, கற்பனை, வடிவம் ஆகியவற்றினை கொண்டு கவிதை படைக்கும் முறைமைகளை அறியச்செய்தல் மற்றும் பயிற்சி அளித்தல்

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கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	குறுங்கவிதைகள் குறித்து புரிந்து கொள்ளச் கொள்வர்.	K1, K2
கற்றலின் பயன்கள் 2	குறுங்கவிதைகளின் வகைமைகளை பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றலின் பயன்கள் 3	குறுங்கவிதைகளின் பாடுபொருள், உத்திமுறைகளைப் பகுத்தாராய்வர்.	K4
கற்றலின் பயன்கள் 4	சமுதாயத்தினை குறுங்கவிதைகள் பதிவுச்செய்யும் நிலைக்குறித்து மதிப்பிட்டு அறிவர்.	K5
கற்றலின் பயன்கள் 5	குறுங்கவிதைகளின் தனித்துவங்கள், படைக்கும் முறைகள் குறித்து முழுமையாக அறிந்து படைப்பாளர்களாக மாறும் திறன் பெறுவர்	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	2	2
CO 2	3	3	3	3	3	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	2	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை -

சங்க இலக்கியங்கள்

PTAM412

பருவம் : நான்காம் பருவம்
பிரிவு : முதன்மைப்பாடம் - X
வகுப்பு : II M.A. தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	சங்க இலக்கியத்தின் சிறப்பினைப் புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	சங்க இலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	சங்க இலக்கியப் பாவகைகளைப் பகுத்தாராய்ந்து பார்க்கும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 4	சங்க இலக்கியத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 5	சங்க இலக்கியத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறன் பெறச் செய்தல்.

அலகு 1 அகம் **12 மணி நேரம்**

குறுந்தொகை முதல் 20 பாடல்கள்- அகநானூறு முதல் 20 பாடல்கள்

அலகு 2 புறம் **15 மணி நேரம்**

புறநானூறு முதல் 20 பாடல்கள்

அலகு 3 பதிற்றுப்பத்து **12 மணி நேரம்**

பதிற்றுப்பத்து - ஆறாம்பத்து - 5 பாடல்கள் 2, 3, 5, 8,10 (6- ஆம் பத்து - ஆடு கோட்பாட்டுச் சேரலாந்தனைக் காக்கைபாடியார் பாடியவை)

அலகு 4 ஆற்றுப்படை **12 மணி நேரம்**

சிறுபாணாற்றுப்படை - (1 - 269 அடிகள்)

அலகு 5 குறிஞ்சிப்பாட்டு **14 மணி நேரம்**

குறிஞ்சிப்பாட்டு முழுவதும் - (1-261 அடிகள்)

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வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	சங்க இலக்கியத்தின் சிறப்பினைப் புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	சங்க இலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	சங்க இலக்கியத்தின் பாவகைகளைப் பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	சங்க இலக்கியத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	சங்க இலக்கியத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறனை பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 77%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை -

தொல்காப்பியம் - சொல்லதிகாரம்

PTAM413

பருவம் : நான்காம் பருவம்
பிரிவு : முதன்மைப்பாடம் - XI
வகுப்பு : II M.A. தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்த மணிநேரம் : 65

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் - 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்ளச் செய்தல்.
கற்றலின் நோக்கம் - 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கச் செய்தல்.
கற்றலின் நோக்கம் - 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராய்ச் செய்தல்.
கற்றலின் நோக்கம் - 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் - 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெற செய்தல்.

அலகு 1

கிளவியாக்கம்

12 மணி நேரம்

அலகு 2

வேற்றுமையியல், வேற்றுமை மயங்கியல்

13 மணி நேரம்

அலகு 3

விளிமரபு, பெயரியல்

12 மணி நேரம்

அலகு 4

வினையியல், இடையியல்

14 மணி நேரம்

அலகு 5

உரியியல், எச்சவியல்

14 மணி நேரம்

பாடநூல்

- தொல்காப்பியம் சொல்லதிகாரம், (2003). (சேனாவரையர் உரை). தமிழ்மண் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- அகத்தியலிங்கம், ச. (2008). தொல்காப்பிய மொழியியல். அண்ணாமலைப் பல்கலைக்கழகம். சிதம்பரம்.
- சுப்ரமணியன், ச.வே. (2002). இலக்கணத்தொகை. பாரி நிலையம். சென்னை.
- வெள்ளைவாரணர், கா. (2006). தொல்காப்பியம். அண்ணாமலைப் பல்கலைக்கழகம். சிதம்பரம்.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	தொல்காப்பிய இலக்கண நெறிகளை புரிந்துக் கொள்வர்.	K1, K2
கற்றலின் பயன்கள் 2	இலக்கணத்தினை இலக்கியத்துடன் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றலின் பயன்கள் 3	இலக்கணத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றலின் பயன்கள் 4	இலக்கணக்கொள்கைகளை அக்கால சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றலின் பயன்கள் 5	இலக்கணத்தின் தனித்துவத்தினையும் இலக்கியம் படைக்கும் உத்தி முறைகளையும் அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும் இலக்கணத்தினை பயன்படுத்தும் திறனை பெறுவர்.	K6

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	2	3	3	3	3	3

உயர்தர இணை நிலை 76%

இடைநிலை இணைநிலை 24%

குறைதர இணைநிலை 0%

இணையமும் தமிழும்
PTAM414

பருவம் : நான்காம் பருவம்
பிரிவு : முதன்மைப்பாடம் - XII
வகுப்பு : II M.A. தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 05
மொத்தமணி நேரம் : 65

கற்றல் நோக்கம் வரிசை எண்	கற்றல் நோக்கம்
கற்றல் நோக்கம் 1	இணையத்தில் தமிழின் தோற்ற நிலை மற்றும் வளர்ச்சி படிநிலைகளை புரிந்து கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	இணையத்தினை பயன்படுத்தும் முறைகள் குறித்தும் இணையத்தில் தமிழின் பங்களிப்புகள் குறித்தும் பொருத்திப் பார்க்கச் செய்தல்.
கற்றல் நோக்கம் 3	இணையத்தின் தேவைகளை சமூகத்தோடு பொருத்திப் பார்த்து சமுதாயத்தில் இணையத்தின் தேவை குறித்து பகுத்தாராயச் செய்தல்.
கற்றல் நோக்கம் 4	இணையம், இணையத்தமிழ், இணையத்தமிழ் இதழ்களின் தேவை மற்றும் பங்களிப்பு நிலைகளை மதிப்பிடச் செய்தல்.
கற்றல் நோக்கம் 5	தமிழை இணையத்தில் பயன்படுத்தும் நிலைகளை அறிந்து படைப்புகளை தரவேற்றம் செய்யும் ஆற்றல் மற்றும் செயலிகளை உருவாக்கும் திறன்களைப் பெற செய்தல்.

அலகு 1 இணையம்

12 மணி நேரம்

இணையம் அறிமுகம் - இணையம் சொல் விளக்கம் - மேம்பாட்டு ஆய்வுத்திட்ட முகவான்மை வலையகம் - ஆர்பா நெட் - டார்பா நெட் - இணையத்தின் வளர்ச்சி - உலகளாவிய வலையின் தோற்றம் - இணைய உலாவிகள் .

அலகு 2 இணையத்தமிழ்

15 மணி நேரம்

தமிழின் முதல் வலையேற்றம் - இணையத்தில் தமிழின் பயன்பாடு - தமிழ் இணையக்கல்விக்கழகம் - இணையத்தில் தமிழ்க்கல்வி தமிழ் - இணையக் கல்விக்கழகம் - குறிக்கோள்கள் - கல்வித்திட்டம் - பாடத்திட்டங்கள் - சான்றிதழ் - பட்டயம் இணைய வகுப்பறை - தேர்வு முறைகள் - மின் நூலகம் - சுவடிக்காட்சியகம் - கலைச்சொல் தொகுப்புகள்

அலகு 3 இணையத்தமிழ் இதழ்கள்

12 மணி நேரம்

இணையத்தமிழ் இதழ் - இணையத்தமிழ் இதழ்களின் பொதுப்பண்புகள் - இணையத்தமிழ் இதழ்களின் தோற்றம் - வளர்ச்சி நிலைகள் - இணைய இதழ்களின் வகைபாடுகள் - இலக்கியம் - படைப்பு - பல்சுவை - பக்தி - புகலிடம் - சமூகம் - ஆய்வு - மருத்துவம் - அறிவியல் - மகளிர் - தனிமனித கருத்துக்கள்.

அலகு 4 வலைப்பதிவு, மின்னஞ்சல்**12 மணி நேரம்**

வலைப்பதிவு சொற்பொருள் விளக்கம் - வலைப்பதிவின் பகுதிகள் - பதிவின் முகப்பு - தலைப்பு - உட்பகுதி - இடுகைகள் சேமிப்பகம் - தொடுப்புகள் - வலைப்பதிவின் பொதுப்பண்புகள் - வலைப்பதிவின் வகைப்பாடுகள் - மின்னஞ்சல் சேவைத்தரும் நிறுவனங்கள் - மின்னஞ்சலின் பகுதிகள் - தமிழில் மின்னஞ்சல் அனுப்பும் வழிமுறைகள் - மின்னஞ்சலின் பொதுப்பண்புகள் - சிறப்புகள் - இணையத் தேடுதளங்கள் - தேடுதளங்களின் அமைப்பு முறைகள் - தமிழில் இணையத்தேடுதலுக்கான வழிமுறைகள்.

அலகு 5 தமிழ் வளர்ச்சியில் இணையம்**14 மணி நேரம்**

இணையத்தில் தமிழ் அகராதி - கலைக்களஞ்சியம் - விக்கிப்பீடியா - மொழிப்பெயர்ப்புகள் - நூலகங்கள் - தமிழாய்வு வளர்ச்சியில் இணையத்தின் பங்களிப்புகள்.

பாட நூல்கள்

- இளங்கோவன், மு. (2009). இணையம் கற்போம். வயல் வெளிப் பதிப்பகம். அரியலூர்.
- மணிகண்டன், வே. (2019). இணையம், இணையத்தமிழ், இணையத்தமிழ் இதழ்கள். தேனுகா பதிப்பகம். புதுச்சேரி.

பார்வை நூல்கள்

- ஆனந்தகிருஷ்ணன், மு. (க.ஆ). தமிழ்மொழி வளர்ச்சியில் இணையத்தின் பங்கு. உலகத்தமிழ் செம்மொழி மாநாட்டுச் சிறப்பு மலர். கோவை.

கற்றல் பயன்கள் வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன்கள் 1	இணையத்தில் தமிழின் தோற்ற நிலை மற்றும் வளர்ச்சி படிநிலைகளை புரிந்து கொள்வர்.	K1, K2
கற்றல் பயன்கள் 2	இணையத்தினை பயன்படுத்தும் முறைகள் குறித்தும் இணையத்தில் தமிழின் பங்களிப்புகள் குறித்தும் பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன்கள் 3	இணையத்தின் தேவைகளை சமூகத்தோடு பொருத்திப் பார்த்து சமுதாயத்தில் இணையத்தின் தேவை குறித்து பகுத்தாய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன்கள் 4	இணையம், இணையத்தமிழ், இணையத்தமிழ் இதழ்களின் தேவை மற்றும் பங்களிப்பு நிலைகளை மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன்கள் 5	தமிழை இணையத்தில் பயன்படுத்தும் நிலைகளை அறிந்து படைப்புகளை தரவேற்றம் செய்யும் ஆற்றல் மற்றும் செயலிகளை உருவாக்கும் திறன்களைப் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	1	1
CO 2	3	3	2	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 71%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை 06%

நாடகவியல்

PTAO401

பருவம் : நான்காம் பருவம்

தரம் : 03

பிரிவு : சார்புப்பாடம் - VII

மணிநேரம் / வாரம் : 05

வகுப்பு : II M.A. தமிழ்

மொத்தமணி நேரம் : 65

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	நாடகத்தின் தோற்றம் வளர்ச்சி படிநிலைகளை புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	நாடக இலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	நாடகத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 4	நாடகத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறச் செய்தல்
கற்றல் நோக்கம் 5	நாடகத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறனை பெறச் செய்தல்.

அலகு 1 நாடக வரலாறு

12 மணி நேரம்

நாடகத்தின் தோற்றமும் வளர்ச்சியும் சங்க காலம் சங்கம் மருவிய காலம் 17,18,19,20 ஆம் நூற்றாண்டுகளின் உள்ள நாடகங்கள்.

அலகு 2 நாடக ஆசிரியர்கள்

15 மணி நேரம்

தமிழ் நாடக ஆசிரியர்களின் வாழ்க்கை வரலாறும் ஆற்றிய பணிகளும்

அலகு 3 நாடக வகைகள்

12 மணி நேரம்

நாடக அமைப்பும் - வளர்ச்சியும் - பொதுவியல் நாடக வகைகள் தெருக்கூத்து மொழிபெயர்த்து நாடகங்கள் - ஓரங்க நாடகம் - மேடை நாடகம் வரலாற்று நாடகம் - புராண நாடகம்

அலகு 4 வானொலி, தொலைக்காட்சி நாடகங்கள்**12 மணி நேரம்**

வானொலி நாடகத்தின் தனித்துவங்கள்- பாடுபொருள்கள் - படைப்பாக்க உத்தி முறைகள் – தொலைக்காட்சி நாடகத்தின் செல்வாக்கு – தொலைக்காட்சி நாடகத்தின் சிறப்புக்கள்.

அலகு 5 நாடகப்பயிற்சி**14 மணி நேரம்**

நாடக நடிகர் அல்லது ஆசிரியராக உருவாகுவதற்கு பயிற்சி அளித்தல்

பாடநூல்கள்

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பார்வை நூல்கள்

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- குணசேகரன், கே. ஏ. (2013). நாடக அரங்கம். என். சி.பி.எச், சென்னை.
- பிரபாகர், ஆர். (2019). சினிமா ஓர் அறிமுகம், காலச்சுவடு பதிப்பகம். நாகர்கோவில்.
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- இராமசாமி,மு. (2014). திராவிட இயக்கமும் கலைத்துறையில் நாடகத்தில் (எதிர்கொண்ட கலங்கள்). நியூ செஞ்சரி ஹவுஸ். சென்னை.
- குணசேகரன்,கே.ஏ.(1987). தமிழ் நாடகமும் சங்கரதாஸ் சுவாமிகளும். அகரம் பதிப்பகம். சிவகங்கை.

வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	நாடகத்தின் தோற்றம் வளர்ச்சி படிநிலைகளை புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	நாடக இலக்கியத்தின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	நாடகத்தின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	நாடகத்தின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	நாடகத்தின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறனை பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	1	1
CO 2	3	3	2	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 71%

இடைநிலை இணைநிலை 23%

குறைதர இணைநிலை 06%

ஆய்வேடு PTAP402

பருவம் : நான்காம் பருவம்
பிரிவு : ஆய்வு
வகுப்பு : II M.A. தமிழ்

தரம் : 04
மணிநேரம் / வாரம் : 06
மொத்தமணி நேரம் : 78

நோக்கம்

- மாணவிகளிடம் ஆய்வு பார்வையை அறிமுகப்படுத்துதல்.

ஒரு குறிப்பிட்ட பொருண்மையைத் தெரிவு செய்து அது தொடர்பாக ஆசிரியர்களின் நெறிபடுத்துதல் துணையோடு சுமார் 50 பக்க அளவில் ஆய்வேட்டினைச் சமர்ப்பிப்பர்.

பதிப்பியல் PTAC401

பருவம் : நான்காம் பருவம்
பிரிவு : பணிச்சார் திறன் பாடம்
வகுப்பு : II M.A. தமிழ்

தரம் : 02
மணிநேரம் / வாரம் : 04
மொத்தமணி நேரம் : 52

வரிசை எண்	கற்றல் நோக்கங்கள்
கற்றல் நோக்கம் 1	பதிப்பியல் மற்றும் சுவடியியலின் தோற்றம் வளர்ச்சி படிநிலைகளைப் புரிந்துக் கொள்ளச் செய்தல்.
கற்றல் நோக்கம் 2	பதிப்பியலின் வகைகளைப் பொருத்திப்பார்க்கும் திறன் பெறச்செய்தல்.
கற்றல் நோக்கம் 3	பதிப்பியலின் படிநிலைகளைப் பகுத்தாராய்ந்து பார்க்கும் திறன் பெறச் செய்தல்.
கற்றல் நோக்கம் 4	பதிப்பியலின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறச் செய்தல்.

கற்றல் நோக்கம் 5	பதிப்பியலின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறன் பெறச் செய்தல்.
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அலகு 1 சுவடிப் பதிப்பியலும் பதிப்பு வரலாறும்

12 மணி நேரம்

தமிழில் தொடக்க கால பதிப்பு முயற்சிகள் - ஆறுமுக நாவலர், சி. வை. தா., உ.வே.சா., வையாபுரி பிள்ளை முதலியரின் பதிப்பு பணிகள் - சுவடிப்பதிப்பு நெறிமுறைகள் - பாட பேதம் - மூலபாடத் திறனாய்வு -தமிழ் பதிப்பு வரலாறும் இன்றைய நிலையும்.

அலகு 2 புத்திலக்கியப் பதிப்பியலும் பதிப்பு வரலாறும்

10 மணி நேரம்

பாரதி, பாரதிதாசன், புதுமைப்பித்தன் முதலியரின் படைப்புகளும் பதிப்பு வரலாறும் - புத்திலக்கியப் பதிப்பு நெறிமுறைகள் - பதிப்பு சிக்கல்கள் - அடைய வேண்டிய இலக்கு.

அலகு 3 கணினி பயிற்சியும் பண்பாடும் பதிப்பியலும்

10 மணி நேரம்

கணினி பயிற்சி - தொழில்நுட்ப அறிவு - பதிப்பியலின் புலமை சார்ந்த கூறுகளில் கணினி பயன்பாடு - சொல்லடைவு உருவாக்கம் முதலியன - வெளியிட்டியலில் கணினியின் பயன்பாடு - எழுத்துரு, பக்க வடிவமைப்பு - நூலட்டை உருவாக்கம் முதலியன.

அலகு 4 இணைய பயன்பாடும் பதிப்பியலும்

10 மணி நேரம்

மின் நூலகங்கள் - ஓலைச்சுவடிகளின் மின் படிகள் - உலகளாவிய நிலையில் நூலக நூல் பட்டியல் முதல் என அறிதல் - தமிழ் இணையம் - மின்னூலகம் - பயன்பாடு, உலகளாவிய நிலையில் நூலகத் தலங்கள் முதலியன - பதிப்பு ருவாக்கங்களுக்குப் பயன்படுத்துதல்.

அலகு 5 பிழைத்திருத்தம், சந்தியிலக்கணம், மொழிநடை

10 மணி நேரம்

நூல் வெளியீட்டில் பிழைகளைத்திருத்தும் பயிற்சி - பிழை திருத்துதல் - அறியவேண்டிய மொழி இலக்கணம் - சந்தி இலக்கணம் - யாப்பறிவு - மொழிப்பயன்பாட்டில் எழும் புதிய சிக்கல்கள் குறித்த சிந்தனைகள்.

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பார்வை நூல்கள்

- இளங்குமரன், இரா. (1991). சுவடிக்கலை. அரிமாப் பதிப்பகம். சேலம்.
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வரிசை எண்	கற்றல் பயன்கள்	Bloom's Level
கற்றல் பயன் 1	பதிப்பியல் மற்றும் சுவடியியலின் தோற்றம் வளர்ச்சி படிநிலைகளை புரிந்துக் கொள்வர்.	K1, K2
கற்றல் பயன் 2	பதிப்பியலின் வகைகளை பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K3
கற்றல் பயன் 3	பதிப்பியலின் படிநிலைகளை பகுத்தாராய்ந்து பார்க்கும் திறன் பெறுவர்.	K4
கற்றல் பயன் 4	பதிப்பியலின் வாயிலாக சமூகம் சார்ந்து மதிப்பிடும் திறன் பெறுவர்.	K5
கற்றல் பயன் 5	பதிப்பியலின் தனித்துவத்தினை அறிந்து வாழ்க்கையையிலும், படைப்புகளிலும், கலை இலக்கியத்துறைகளிலும் பயன்படுத்தும் திறன் பெறுவர்.	K6

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

உயர்தர இணை நிலை 70%

இடைநிலை இணைநிலை 30%

குறைதர இணைநிலை -

**அகமதிப்பீட்டிற்கான III ஆம் மற்றும் IV ஆம் உட்கூறுகள்
முதுகலைத்தமிழ்**

பருவம்	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	I உட்கூறுகள்	II உட்கூறுகள்
III	முதன்மைப்பாடம் - VII	PTAM311	சிற்றிலக்கியம்	மாதிரி உருவாக்கம்	கையேடு தயாரித்தல்
	முதன்மைப்பாடம் - XI	PTAM312	தொல்காப்பியம் - எழுத்து	இலக்கண சுவடி	இலக்கண ஆய்வடங்கல்
	முதன்மைப்பாடம் - IX	PTAM313	ஆராய்ச்சி நெறியியல்	கருத்தரங்கம்	ஆய்வுப்பயிற்சி
	தொழில்சார் பாடம்	PTAM314	பேச்சுக்கலை	கருத்தரங்கம்	விளம்பர உருவாக்கம்
	சார்புப்பாடம்- V (குறை சார்ந்தது)	PTAO301	படைப்புத்திறன்	கருத்தரங்கம்	பயிற்சி
	சார்புப்பாடம்- VI (மரபு சார்ந்தது)	PTAO302	ஒப்பிலக்கிய நெறிகள்	கால அட்டவணை	கள ஆய்வு
	துறையிடைப்பாடம்	PTAI301	குறுங்கவிதை வடிவங்கள்	நூல் மதிப்பீடு	பயிற்சி
IV	முதன்மைப்பாடம் - X	PTAM412	சங்க இலக்கியங்கள்	கருத்தரங்கம்	கால அட்டவணை
	முதன்மைப்பாடம் - XI	PTAM413	தொல்காப்பியம் - சொல்லதிகாரம்	சொல் இலக்கண கையேடு	சொல்லின் வகைகள் அட்டவணை
	முதன்மைப்பாடம் - XII	PTAM414	இணையமும் தமிழும்	மாதிரி உருவாக்கம்	பிரமிடு தயாரித்தல்
	சார்புப்பாடம் - VII (குறை சார்ந்தது)	PTAO401	நாடகவியல்	காட்சி அமைப்பு	திரைக்கதை உருவாக்கம்
	பணிச்சார் திறன் பாடம்	PTAC401	பதிப்பியல்	மாதிரி வடிவமைப்பு	பதிப்பு கையேடு தயாரித்தல்

DEPARTMENT OF ENGLISH

PREAMBLE

- UG** : Programme Profile and Syllabi of Courses from III to IV semesters along with Evaluation Components III and IV (With effect from 2024-2025 Batch Onwards)
- PG** : Programme Profile and Syllabi of Courses from III to IV semesters along with Evaluation Components III and IV (With effect from 2024-2025 Batch Onwards)

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO.No	Upon Completion of these course the undergraduate will be able to
PSO-1	Demonstrate effective communication skills in reading, writing, speaking, and listening, applying them to various academic and professional contexts.
PSO-2	Interpret literary texts using critical thinking skills, considering historical and cultural contexts, and applying various theoretical frameworks.
PSO-3	Compose independent research, insightful arguments in critical discussions about literature and related topics.
PSO-4	Validate an understanding of diverse cultural perspectives and their representation in literature, critically engaging with social issues and their portrayal.
PSO-5	Develop transferable skills applicable to various careers, exhibiting a commitment to continuous learning and professional growth.
PSO-6	Formulate ethical awareness and sensitivity to diverse values, acting as responsible citizens who contribute meaningfully to a globalized world

PROGRAMME PROFILE – B.A ENGLISH

Sem ester	Part	Category	Course Code	Course Title	Contact Hour/ Week	Credit Min/Max
I	I	Language: Tamil/ Hindi/ French	UTAL110 / UHIL102 UFRL102	General Tamil-I/ Hindi-I/ French-I	5	3
	II	Language: English	UENL111	General English -I	5	3
	III	Core Courses - I	UENM111	Introduction to Literature	5	4
	III	Core Courses - II	UENM112	Indian Writing in English	5	4
	III	Elective Course 1 (Generic / Discipline Specific)	UENA105	Social History of England	4	3
	IV	Foundation Course FC	UENF101	Foundation Course	2	2
	IV	Skill Enhancement Course – SEC- (NonMajor Elective)			2	2
	IV	Ability Enhancement Compulsory Course (AECC 1) -Soft Skill	USKS105	Soft Skill-1- Communicative English	2	2
Total					30	23
II	I	Language : Tamil/ Hindi/ French	UTAL210/ UHIL202 UFRL202	General Tamil II/ Hindi-II/ French-II	5	3
	II	LE: Language	UENL211	General English-II	5	3
	III	Core Courses - III	UENM211	British Literature-I	5	4
	III	Core Courses - IV	UENM212	American Literature -I	5	4
	III	Elective Course II (Generic / Discipline Specific)	UENA205	History of English Literature	4	3
	IV	Skill Enhancement Course – SEC- (Discipline Subject Specific)	UEND201	The Art of Radio Jockey	2	2

	IV	Skill Enhancement Course – SEC- (Non Major Elective)			2	2
	IV	Ability Enhancement Compulsory Course (AECC 2) Soft Skill-2	USKS205	Soft Skill-2	2	2
	III	Internship / Industrial Training	UINS201	Internship / Industrial Training		-/ 2
	V	Extension Activity/ Physical Education/ NCC				½
	VI	Value added courses (Outside class hours)	CENG401			-/2
Total					30	24/29
III	I	Language: Tamil/ Hindi/ French	UTAL310/ UHIL302 UFRL302	General Tamil-III/ Hindi-III/ French-III	5	3
	II	Language: English	UENL311	General English -III	5	3
	III	Core Course - V	UENM311	British Literature-II	4	4
	III	Core Course – VI	UENM312	Introduction to Comparative Literature	4	4
	III	Elective Course 3 (Generic / Discipline Specific) -EC3	UENA305	Literary Genres and Forms	4	3
	IV	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	UEND301	English for Communication	2	2
	IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	UENU302	Content Writing for Marketing & Branding	2	1
	IV	Ability Enhancement Compulsory Course (AECC	USKS301	Soft Skill-3	2	2

		3) Soft Skill-3				
	IV	Value Education	UGEV301	Value Education	2	2
	Total				30	24
IV	I	Language: Tamil/ Hindi/French	UTAL410/ UHIL402/ UFRL402	General Tamil IV/ Hindi-II/ French-II	5	3
	II	Language: English	UENL411	General English-IV	5	3
	III	Core Course - VII	UENM41 1	American Literature-II	5	4
	III	Core Course - VIII	UENM41 2	World Literature in Translation	5	4
	III	Elective Course - EC4 (Generic)	UENA405	Myth and Literature	4	3
	IV	Skill Enhancement Course – SEC-6 (Discipline Specific)	UEND401	English for Business	2	2
	IV	Skill Enhancement Course- Online course	UONL401	Online Course *	2	2
	IV	Ability Enhancement Compulsory Course (AECC 4) Soft Skill-4	USKS401	Soft Skill-4	2	2
	III	Internship Industrial Training	UINS401	Internship / Industrial Training	-	-/ 2
	V	Extension Activity/ Physical Education/NCC			-	-/2
VI	Value added course (Outside class hours)	VENG401		-	-/2	
Total					30	23/29
V	III	Core Course – IX	UENM51 1	Aspects of Language and Linguistics	5	4
	III	Core Course – X	UENM51 2	Women’s Writing in English	5	4
	III	Core Course – XI	UENM51 3	Introduction to Literary Theory and Criticism	5	4
	III	Elective Course – EC5 (Generic / Discipline Specific)	UENO505	Media Communication and Publication	5	3
	III	Elective Course –	UENO506	English for Competitive	4	3

		EC6 (Generic / Discipline Specific)		Examinations		
	III	Core Course - XII	UENP502	Project with Viva voce	4	4
	IV	Environmental Studies		Environmental studies	2	2
Total					30	24
VI	III	Core Course – XIII	UENM611	Literary Criticism	5	4
	III	Core Course – XIV	UENM612	Indian Literature in Translation	5	4
	III	Core Course – XV	UENM613	Travel Writing	5	4
	III	Elective Course – EC7 (Generic / Discipline Specific)	UENO605	Digital Literature	6	4
	III	Elective Course – EC8 (Generic / Discipline Specific)	UENA606	English at Workplace	5	3
	III	Comprehensive Viva-voce	UENM619		-	1
	IV	Professional Competency Skill Enhancement Course SEC8	UENC601	Professional Competency	4	2
	III	Internship Industrial Training (semester vacation 30 Hrs)	UINS601	Internship / Industrial Training	-	-/2
	V	Extension Activity/ Physical Education/NCC			-	-/2
VI	Value add course			-	-	
Total					30	22/26
OVERALL TOTAL					180	140/155

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Contact Hrs /week	Credit
II	Core	UENI201	Summer Internship	-	1
IV	Core	UENI 401	Summer Internship	-	1
V	Self-Study	UENS501	Practice of Translation (Self Study)	26	1
VI	Core	UENP601	Mini-Project	26	1

GENERAL ENGLISH

UENL311

Semester : III
Category : Language
Class & Major : II B.A. English

Credits : 3
Hours/Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Identify the grammar rules and sentence structures.
CO-2	Apply the intended message of a written or spoken communication.
CO-3	Examine appropriate vocabulary words to real-life situations.
CO-4	Expose the learners to value based ideas and enhance the language skills, especially in Pronunciation.
CO-5	Develop original stories, poems, or other creative writing pieces.

UNIT I : Poetry

13 Hours

Mamang Dai : The Voice of the Mountains
Toru Dutt : Sita
Oodgeroo Noonuccal : A Song of Hope
Christina Rossetti : In an Artist's Studio

UNIT II : Scenes From Shakespeare

13 Hours

Romeo & Juliet : The Balcony Scene
Macbeth : Banquet Scene
Othello : Desdemona's Death

UNIT III : Speeches of Famous personalities

13 Hours

Stephen Hawking : Questioning the Universe
Barack Obama : Yes, We Can
Steve Jobs : You've Got to Find What You Love

UNIT IV : Language Competency

13 Hours

Writing letters and emails, Content Writing in social media platforms

UNIT V : English for Workplace

13 Hours

Data Interpretation and Reporting, Emotional Intelligence, Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used
Conducting and participating in a meeting

Text Books

- Shakespeare, W. (2014). *Arden Shakespeare complete works*. Bloomsbury

Publishing.

Reference Books

- Elkin, S. (2015). The Shakespeare Book: Big Ideas Simply Explained. *The School Librarian*, 63(2), 123.
- Kraakevik, J. (2016). Crafting a positive professional digital profile to augment your practice. *Neurology: Clinical Practice*, 6(1), 87-93.
- Yu, X. (2017). Keys to Teaching Grammar to English Language Learners: A Practical Handbook. null.
- Yardley-Matwiejczuk, K. M. (1997). *Role play: theory and practice*. Sage.

E-Resources

- A song of Hope by Kath Walker:
<http://www.wordslikethis.com.au/a-song-of-hope/>
- <https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio>

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Utilize appropriate grammar, vocabulary, and sentence structures in written and spoken communication.	K1,K2
CO-2	Interpret the meaning and purpose of various types of texts (emails, news articles, stories).	K3
CO-3	Distinguish between formal and informal language use, adapting their communication accordingly.	K4
CO-4	Formulate and defend their own opinions and arguments in discussions and writing tasks.	K5
CO-5	Develop and present persuasive arguments on topics of Personal interest.	K6

CO-PSO Mapping

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	1	0	1	1	2
CO3	3	1	0	0	1	2
CO4.	3	2	3	3	3	2
CO5	3	2	3	3	3	2

High Correlation: 33% Low Correlation: 17% Medium Correlation: 40%

No Correlation : 10

BRITISH LITERATURE II

UENM311

Semester : III
Category : Core -V
Class &Major : II B.A. English

Credits 4
Hours/Week 4
Total Hours 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Identify literature as it relates to its historical, cultural, and political context.
CO-2	Interpret British Literature from the late 18th Century to the present.
CO-3	Construct relationships between various movements (such as Romanticism, Victorianism, Modernism, and Postmodernism) and the literature of the period.
CO-4	Examine literary works using critical perspectives.
CO-5	Create appropriate formal conventions when writing about literature.

UNIT I: Poetry

10 Hours

Alfred Tennyson	: The Lotos-Eaters
Robert Browning	: My Last Duchess
Imtiaz Dharker	: Another Woman
T.S. Eliot	: The Wasteland
W.H. Auden	: The Unknown Citizen
Philip Larkin	: The Whitsun Weddings

UNIT II: Prose

10 Hours

George Orwell	: Shooting an Elephant
Charles Lamb	: Dream Children
William Hazlitt	: Indian Jugglers
Joseph Addison	: Sir Roger at Church/Sir Roger in London

UNIT III : Drama

10 Hours

G.B Shaw	: Arms and The Man
John Osborne	: Look Back in Anger

UNIT IV : Fiction

10 Hours

Jane Austen	: Persuasion
Charlotte Brontë	: Jane Eyre

UNIT V: Novel

12 Hours

Wilkie Collins	: The Moonstone
Arthur Conan Doyle	: Hound of Baskervilles
Bram Stoker	: Dracula. (Graphic Novel)

Text Books

- Renard, V. (2013). *The Great War and postmodern memory: The First World War in late 20th-century British fiction (1985-2000)*. Peter Lang International Academic Publishers.

Reference Books

- Brontë, C. (2018). *Jane eyre*. In *Medicine and Literature, Volume Two* (pp. 53-72). CRC Press..
- Lamb, C., & Rogers, B. (1923). *Dream-Children: A Reverie*. Pr. by Bruce Rogers.

E-Resources

- Makinen, Merja. "Representing Women of Violence Agatha Christie and Her Contemporary Culture." *Agatha Christie*, 2006, pp. 135– 157., https://doi.org/10.1057/9780230598270_6
- Smith, Grover. "Eliot's World before the Waste Land." *The Waste Land*, 2020, pp.1–17., <https://doi.org/10.4324/9781003070627-1>

COURSE OUTCOMES

CO. No	On completion of the course the students will be able to	Bloom's Level
CO-1	Identify and describe the literary characteristics of the 18 th Century British Literature	K1,K2
CO-2	Interpret the themes, symbols, and motifs present in selected British literary works	K3
CO-3	Apply knowledge of literary techniques to interpret and analyze British literary texts from different periods, genres, and authors.	K4
CO-4	Examine the connections between British literature and its historical, cultural, and intellectual contexts.	K5
CO-5	Evaluate the significance of selected British literary works within the broader canon of English literature.	K6

CO PSO Mapping

CO / PSO	PSO1.	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	2	2	2	2
CO4.	3	3	3	3	2	2
CO5	2	2	2	2	2	2

High Correlation: 47%, Low Correlation: 0%, Medium Correlation: 53%

INTRODUCTION TO COMPARATIVE LITERATURE

UENM312

Semester : III
 Category : Core VI
 Class & Major: II BA English

Credits: 4
 Hours/Week: 4
 Total Hours :52

COURSE OBJECTIVE

CO.NO	To enable the students to
CO 1	Acquire a broad knowledge of various literary traditions both in their specificity and interrelation.
CO 2	Gain a deeper awareness of cultural and linguistic Diversity.
CO 3	Interpret a literary text or other cultural artifact in a non-native target language.
CO 4	Cultivate a complex, transdisciplinary understanding and appreciation of literary texts from a variety of different traditions, genres, periods, and areas.
CO 5	Develop the skills to move among diverse cultures.

UNIT- I Introduction to Comparative Literature**11 Hours**

Definition and Scope, National Literature, Comparative Literature, General Literature, World Literature, the French and American Schools of Comparative Literature.

UNIT-II Trends in Comparative Literature**10 Hours**

Influence and Imitation- Periodization Movement, Genre Studies, Thematology

UNIT- III Poetry**11 Hours**

Selected poems of Shelley- Ode to Liberty, Queen Mab, and Love's Philosophy.

Selected poems of Subramaniya Bharathi- Bharath Country, Worship of Sun, Kannan My Servant.

Comparative Study of Shelley and Bharathi.

UNIT-IV Drama**10 Hours**

Comparative study of Kalidasa's Shakuntala & Shakespeare's Tempest

UNIT-V Novel**10 Hours**

Comparative study of Vairamuthu's KallikattuIthikasam

Ernest Hemingway's 'The Old Man and the Sea.

Text Books

- Shelley, P. B. (1834). *Queen mab*. John Ascham..

Reference Books

- Goslee, N. M. (1994). Pursuing Revision in Shelley's " Ode to Liberty". *Texas studies in literature and language*, 36(2), 166-183.
- Hemingway, E. (1995). *The Old Man and the Sea*. 1952. *New York: Scribner*.

E-Resources

- <https://tamilbookspdf.com/books/kallikaattu-ithigaasam-by-vairamuthu/>
- <https://www.researchgate.net/publication/361867667> **SUBRAMANIA BHARATHI THE POLITICAL BIOGRAPHY OF THE POET PATRIOT OF TAMILNADU 1882 -1921**

COURSE OUTCOME

CO. NO	On completion of the course, the students will be able to	Bloom's Level
CO 1	Understand critically, literary and cultural texts in a range of genres and media.	K1/K2
CO 2	Develop knowledge of historical, linguistic, and cultural contexts.	K3
CO 3	Analyze critical terminology and interpretive methods drawn from specific 20 th –and 21 st century comparative and critical theories from multiple disciplines.	K4
CO 4	Appraise the different literary genres through texts in two or more foreign languages.	K5
CO 5	Build a variety of theoretical and methodological approaches to texts.	K6

CO PSO Mapping

CO / PSO	PSO1	PSO2	PSO3	PSO4.	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2.	3	3	3	2	3	3
CO3.	3	3	2	3	3	3
CO4	3	3	3	3	3	3
CO	3	3	1	3	3	3

High Correlation: 90% Low Correlation: 3% Medium Correlation: 7%

LITERARY GENRES AND FORMS

UENA305

Semester : III
Category : Elective
Class & Major: II B.A. English

Credits : 3
Hours/Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Interpret the symbolic meaning and significance of literary elements in specific texts.
CO-2	Discuss the relationship between literary form and content, analyzing how form shapes meaning.
CO-3	Analyze the impact of specific literary devices on the overall tone, mood, and atmosphere of a text.
CO-4	Evaluate the effectiveness of different interpretations of literary elements presented by critics and scholars.
CO-5	Develop and defend arguments about the meaning and significance of literary works.

UNIT I

10 Hours

Introduction to the Literary Theory and terms

UNIT II

11 Hours

Types of prose text-Semiotics

UNIT III

10 Hours

Terms for Interpreting Authorial Voice- Terms for Interpreting Characters

UNIT IV

11 Hours

Terms for Interpreting Word Choice, Dialogue, and Speech- Terms for Interpreting Plot

UNIT V

10 Hours

Terms for Interpreting Layers of Meaning -Cultural Theory: The Key Concepts

Text Books

- Baldick, C. (1996). *The concise Oxford dictionary of literary terms*. Oxford university press..
- Mikics, D. (2007). *A new handbook of literary terms*. Yale university press.

Reference Books

- Taaffe, J. G. (1967). *A student's guide to literary terms*.

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall specific features and elements of different literary forms.	K1,K2
CO-2	Compare the use of literary elements across different genres and historical periods, observing similarities and differences.	K3
CO-3	Evaluate the effectiveness of various interpretations of literary elements	K4
CO-4	Judge the literary merit and artistry of different works based on their use of literary techniques and overall craft.	K5
CO-5	Compose original critical essays presenting unique perspectives and insights on literary texts, demonstrating critical thinking and writing skills.	K6

CO PSO MAPPING

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	2	2	2
CO5	3	3	3	3	3	3

High Correlation: 47% Low Correlation: 0% Medium Correlation: 53%

ENGLISH FOR COMMUNICATION UEND301

Semester : III Credits 2
Category : Elective / DSG I Hours/Week : 2
Class& Major : II B.A. English Total Hours : 26

COURSE OBJECTIVES:

CO.NO.	To enable the Students to
CO1	Introduce fundamental grammar structures to construct simple sentences and questions.
CO2	Enhance the level of communication to convey information, instructions, policies and procedures.
CO3	Enrich their communication skills, to participate in group discussions and personal interviews.
CO4	Develop writing skills for both informal and formal communication, including emails and short essays.
CO5	Equip them with English Knowledge to tackle the numerous communication challenges.

UNIT I Introduction to communication**5 Hours**

Communication: Basic Communication Styles- Passive, Aggressive, Assertive- Significance of communication, Types of communication-Verbal-Non-Verbal, Language as a tool for communication.

UNIT II Listening Skills**6 Hours**

Purpose of Listening, Listening to Conversation (Formal and Informal), Academic Listening, Active Listening- an Effective Listening Skill, Listening to Announcements- (railway/ bus stations/ airport /sports announcement/ commentaries etc.), Listening to Talks and Presentation.

UNIT III Speaking skills**5 Hours**

Effective communication skills, Dialogue, Group Discussion, Effective Communication, Interview, Public Speech.

UNIT IV Reading Skills**5 Hours**

Purpose, Process, Methodologies, Skimming and Scanning, Levels of Reading, Close Reading, Comprehension.

UNIT V Writing Skills**5 Hours**

Application of learning, E-mail, Letter Writing (Formal & Informal), Resume Writing, Report Writing, Making Notes.

Text Books

- Savignon, S. J. (2003). Teaching English as communication: A global perspective. *World Englishes*, 22(1), 55-66.
- Rizvi, M. A. (2005). *Effective technical communication*. Tata McGraw-Hill.

Reference Books

- Adair, J. E. (2005). *How to grow leaders: The seven key principles of effective leadership development*. Kogan Page Publishers.
- O'Connor, J. D. (1980). *Better English Pronunciation*. Cambridge University Press.

E- Resources

- [https:// www.cambridge English .org](https://www.cambridge.org)
- [https://learn English .british council.org.com](https://learn.english.britishcouncil.org)

COURSE OUTCOME

CO.NO.	On completion of the course the student will be able to	Bloom's Level
CO1	Identify and understand basic grammatical structures in English sentences.	K1
CO2	Demonstrate understanding of basic English grammar rules by constructing sentences.	K2
CO3	Apply learned vocabulary and grammar rules to create spoken and written messages in various contexts.	K3
CO4	Analyze and compare different forms of communication in English, such as formal and informal writing.	K4
CO5	Develop English communication skills in authentic scenarios, such as job interviews, meetings, and social interactions.	K5

CO PSO MAPPING

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	0	0	1	2	2
CO2	3	2	2	2	3	2
CO3	2	2	1	0	2	2
CO4	3	2	0	0	3	2
CO5	3	2	0	0	3	2

High Correlation: 20% Low Correlation: 7% Medium Correlation: 50%
No Correlation: 23%

CONTENT WRITING FOR MARKETING & BRANDING

UENU302

Semester : IV
Category : SEC - IV
Class & Major: II B.A English

Credits : 1
Hours/ Week : 2
Total Hours : 26

Course Objectives

CO No.	To enable the students to
CO-1	Understand the role of content marketing in today's business landscape.
CO-2	Identify key principles of effective content writing for marketing and branding.
CO-3	Develop skills in crafting different types of content for various marketing
CO-4	Analyze successful content marketing campaigns and identify key strategies.
CO-5	Create original content pieces that align with specific marketing and branding goals

UNIT I Introduction to Content Marketing & Branding

6 Hours

Understanding the content marketing landscape, Defining brand voice and identity,
Identifying target audiences and buyer personas

UNIT II Content Creation Fundamentals

5 Hours

Different types of marketing content (blogs, articles, website copy, social media content, etc.),
Storytelling techniques for marketing, writing for SEO and social media engagement

UNIT III Advanced Content Writing Skills

5 Hours

Persuasive copywriting techniques, Content writing for different platforms and channels,
Long-form content creation (ebooks, white papers, etc.),

UNIT IV Measuring and Analyzing Content Performance

5 Hours

Key metrics for content marketing success, Analyzing data to measure campaign
effectiveness, Optimizing content for better performance.

UNIT V

5 Hours

Developing a content marketing calendar, Case studies of successful content marketing
campaigns, Building a portfolio of original content pieces, Presenting content strategies and

results.

Text Books:

- Earnshaw, R., & Vince, J. (Eds.). (2012). *Digital content creation*. Springer Science & Business Media.
- Handley, A. (2014). *Everybody writes: your go-to guide to creating ridiculously good content*. John Wiley & Sons..

Reference Books

- MASLEN, A. (2011). *The Copywriting Sourcebook*.
- McDonald, C., & Scott, J. (2007). A brief history of advertising. *The Sage handbook of advertising*, 17-34.

E-Resources

- Content Marketing Institute: <https://contentmarketinginstitute.com/blog/>
- Copyblogger: <https://copyblogger.com/>
- Moz: <https://moz.com/>
- MarketingProfs: <https://www.marketingprofs.com/>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom’s Level
CO-1	Interpret different types of marketing content, including blog posts, social media copy, website content, and email marketing campaigns	K1,K2
CO-2	Optimize content for search engines and social media visibility.	K3
CO-3	Utilize storytelling techniques to engage audiences and connect with their emotions.	K4
CO-4	Measure the performance of their content using key metrics and analyze the results	K5
CO-5	Develop a content marketing strategy aligned with brand objectives.	K6

CO PSO MAPPING

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	0	0	0	3	2
CO2	3	0	0	0	3	3
CO3	3	0	0	2	3	2
CO4	3	1	0	1	3	2
CO5	3	0	3	2	3	2

**High Correlation:40% Low Correlation:07% Medium Correlation: 20%
No Correlation: 33%**

GENERAL ENGLISH

UENL411

Semester	: IV	Credits	3
Category	: Language	Hours/Week	5
Class &Major	: II B.A. English	Total Hours	65

Course Objectives.

CO No.	To enable the students to
CO-1	Interpret the rules of language and tune to deduce language structure and usage.
CO-2	Apply receptive skills through reading and listening to acquire good exposure to language and literature.
CO-3	Demonstrate the style in speech and writing tools of language for effective communication.
CO-4	Estimate the exposure to plays, autobiographies and expose them to value based ideas.
CO-5	Develop the language skills especially in the areas of grammar and pronunciation.

UNIT I Life Writing

13 Hours

- Malala Yousafzai : I am Malala (Chapter 1)
Nikola Tesla : My Inventions (Chapter 2)

UNIT II One Act Plays

13 Hours

- Edward Albee : The Zoo Story
Anton Chekhov : The Swan Song

UNIT III Interviews

13 Hours

- Nelson Mandela's Interview with Larry King.
Rakesh Sharma's Interview with Indira Gandhi from Space
Lionel Messi with Sid Lowe (Print)

UNIT IV Language Competency

13 Hours

Refuting, Arguing & Debating, Making Suggestions & Responding to Suggestions, Asking for and Giving Advice or Help, Interviews (face to face, telephone and video conference)

UNIT V English for Workplace

13 Hours

- Job Applications : Covering letters, CV and Resume
Creating a digital profile : LinkedIn
Filling Forms : creation of account, railway reservation, ATM, credit/debit card
Body Language : Practical Skills for Interviews

Text Books

- Yousafzai, M. (2013). *I am Malala: The girl who stood up for education and was shot by the Taliban*. Hachette UK.
- Moon, F. C. (2014). *Social networks in the history of innovation and invention*. Springer Netherlands.

Reference Books

- Borg, M. (2021). *Writing Your Life: A Guide to Writing Autobiographies*. Routledge.
- Bert, N. A. (1987). *One-act Plays for Acting Students: An Anthology of Short One-*

act Plays for One, Two, Or Three Actors. Meriwether Publishing.

- Yardley-Matwiejczuk, K. M. (1997). *Role play: theory and practice*. Sage..

E-Resources

- Nelson Mandela with Larry King Interviews: <http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html>

- Rakesh Sharma with Indira Gandhi Interview : <https://www.ndtv.com/offbeat/what-first-indian-astronaut-rakesh-sharma-told-indira-gandhi-about-india-from-space-2204839>

- TheZooStory: <http://www.lem.seed.pr.gov.br/arquivos/File/livrosliteraturaingles/zoostory.pdf>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recall and identify key literary terms, such as plot, character, setting, and theme.	K1,K2
CO-2	Recognize and describe the characteristics of different literary genres, including fiction, poetry, and drama.	K3
CO-3	Apply knowledge of literary terms to analyze and describe elements within short stories, poems, or plays.	K4
CO-4	Analyze basic literary devices, such as symbolism and imagery, and their impact on the overall meaning of a text.	K5
CO-5	Evaluate the impact of cultural and historical contexts on the themes and messages conveyed in literary works.	K6

CO PSO MAPPING

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	0	1	3	2
CO3	3	3	2	2	2	2
CO4	3	3	2	3	2	2
CO5	3	3	0	0	2	2

**High Correlation: 46% Medium Correlation: 39% Low Correlation: 4%
No Correlation: 11%**

AMERICAN LITERATURE-II

UENM411

Semester : IV
Category : Core Course - VII
Class &Major: II B.A English
COURSE OBJECTIVES

Credits : 4
Hours/ Week : 5
Total Hours : 65

CO No.	To enable the students to
CO-1	Understand the cultural and historical contexts that influenced the poets, including the literary movements
CO-2	Apply basic theatrical terminology to analyze the structure of the plays.
CO-3	Develop a comprehensive idea about the development of English literature and language over the ages.

CO-4	Analyze the narrative structure and storytelling techniques
CO-5	Examine the structural development of the English language and also to inform them about the various external linguistic influences.

UNIT I Poetry

13 Hours

- Theodore Roethke : The Meadow Mouse
Walt Whitman : When Lilac's Last in the Dooryard Bloom'd
Emily Dickinson : The Bird Came Down the Walk
Maya Angelou : Phenomenal Women
Chief Dan George : My Heart Soars

UNIT II Drama

13 Hours

- Lorraine Hansberry : A Raisin in the Sun
Neil Simon : Barefoot in the Park

UNIT III Memoir & Prose

13 Hours

- Henry David Thoreau : Winter Animals
Ralph Waldo Emerson : The American Scholar
Edgar Allan Poe : Philosophy of Composition

UNIT IV Fiction & Short Story

13 Hours

- Edgar Allan Poe : Tell Tale Heart
Ambrose Bierce : An Occurrence at Owl Creek Bridge
Nathaniel Hawthorne : The Scarlet Letter, Young Goodman Brown (Short Story)

UNIT V Novel

13 Hours

- Mark Twain : The Adventures of Tom Sawyer
Toni Morrison : Beloved

Text Book:

- Angelou, M. (2015). *The complete poetry*. Random House.

Reference Books

- Dickinson, E. (1922). *A Bird came down the Walk*. Unbound Anthology.
- Gray, R. (2011). *A history of American literature*. John Wiley & Sons..
- Beaulieu, E. A. (Ed.). (2003). *The Toni Morrison Encyclopedia* (p. x428). Westport, CT: Greenwood Press..
- Mark, T. (1901). *The Adventures of Tom Sawyer*. Рипол Классик.

E-Resources

- Cramer, Jeffrey S., editor. "Thoreau Describes His Contemporaries." *The Quotable Thoreau*, Princeton University Press, 2011, pp. 430–38, <http://dx.doi.org/10.1515/9781400838004.430>
- Hawthorne, Nathaniel. "The Revelation of the Scarlet Letter." *The Scarlet Letter*, Oxford University Press, 2008, <http://dx.doi.org/10.1093/owc/9780199537808.003.0025>

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the cultural and historical contexts that influenced the poets, including the literary movements	K1,K2
CO-2	Analyze the various genres of American literature (Poetry, Fiction and Drama)	K3
CO-3	Demonstrate the ability to connect Transcendentalist ideas to the authors' works.	K4
CO-4	Evaluate the cultural and historical context of the assigned literary works, considering the impact on character development and thematic elements.	K5
CO-5	Examine literary works of Eminent American writers	K6

CO PSO MAPPING

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	0	1	3	2
CO3	3	3	2	2	2	2
CO4	3	3	2	3	2	2
CO5	3	3	0	0	3	2

High Correlation: 47% Medium Correlation: 40% Low Correlation: 3%

No Correlation: 10%

WORLD LITERATURE IN TRANSLATION

UENM412

Semester : IV

Credits 4

Category : Core VIII

Hours/Week: 5

Class & Major : II B.A. English

Total Hours: 65

COURSE OBJECTIVES

Co. No.	To enable the students to
CO -1	Introduce readers to various cultural practices that have shaped identities across the globe.
CO - 2	Identify translations as independent literary works and perform close-text analysis on these works.
CO -3	Explore literary masterpieces as well as to reinforce their skills in critical thinking and writing within a framework of cultural diversity as well as comparative and interdisciplinary analysis.
CO - 4	Encounter some of the greatest works of ancient, medieval, and renaissance world literature.
CO -5	Formulate rising trends of globalization, capitalism and multi-culturalism.

Unit I Poetry

12 Hours

Dante : Ulysses's Last Voyage

Johann Wolfgang von Goethe : The Violet, The Rose Bush on the Moor.

Victor Hugo : Tomorrow at Dawn.

Khalil Gibran : Your Children are not your children.

Pablo Neruda : If you forget me.

Unit II Fiction 17 Hours

Fyodor Dostoevsky : Crime and Punishment

Jhumpa Lahiri : The Namesake

Unit III Essays 11 Hours

Walter Benjamin : Unpacking My Library

Montaigne : Of Friendship

A.K Ramanujan : On Ancient Tamil Poetics

Unit IV Play 12 Hours

Marie Clements : The Unnatural & Accidental Women.

Federico García Lorca : Yerma

Unit V Short Story 13 Hours

Gabriel García Márquez : A Very Oldman With Enormous Wings.

Ivan S. Turgenev : The District Doctor.

Leo Tolstoy : The Empty Drum

Antoine de Saint-Exupéry : The Little Prince.

Text Books

- García Márquez, G. (2004). A very old man with enormous wings.
- Neruda, P. (2005). *The Poetry of Pablo Neruda*. Macmillan.

References Books

- Angelou, Maya. 2015.*The Complete Poetry*. Random House.
- Benjamin, W., & Zohn, H. (2022). *Unpacking my library* (pp. 59-67). ERIS..
- Bercovici, K. (1930). The story of the Gypsies.
- Kundu, P. Plautus and His Pot of Gold Critical Perspectives..
- Clements, Marie Humber. 2005.*The Unnatural and Accidental Women*. Talon booksLimited.

E- Resources

- The Introduction of Victor Hugo to the English (1823–1830).” *The Fortunes of Victor Hugo in England*, Columbia University Press, 1938, pp. 1–26, <http://dx.doi.org/10.7312/hook93490-002>.

COURSE OUTCOMES

CO.NO	On completion of this course, students will be able to	Bloom's Level
CO1	Understand the works in their cultural/historical contexts and of the enduring human values which unite the different literary traditions.	K1, K2
CO2	Identify elements of universal literary merits as well as critically compare some of the great works of the East and the West.	K3
CO3	Analyze to pay special attention to critical thinking and writing within a framework of cultural diversity as well as comparative and interdisciplinary analysis.	K4
CO4	Develop learner's understanding of translation	K5
CO5	Compose an understanding of the study and consideration of the literary, cultural, and human significance of selected great works of the Western and non-Western literary traditions.	K6

CO PSO MAPPING

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	2	2	0	0	2	2
CO5	3	3	3	3	3	3

High Correlation: 77% Medium Correlation: 17% Low Correlation: 0% No Correlation: 6%

MYTH AND LITERATURE

UENA405

Semester : IV
 Category : Elective Course - EC4 (Generic)
 Class & Major: II B.A English

Credits : 3
 Hours/ Week : 4
 Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the fundamental concepts of myth and mythology.
CO-2	Incorporate properly formatted research in support of an argument; and draw conclusions about a mythic topic or theme.
CO-3	Develop a general understanding of Vedic, Epic, and Puranic Mythology.
CO-4	Explain how literary myths reflect societal rituals and ways of life in various cultures
CO-5	Explore the psychological dimensions of Indian Mythology in Literature, Art, and Music.

UNIT I**11 Hours**

Introduction to Myth/ Mythology-Sources of Indian mythology and Greek Mythology -
Types of story and its relation to myth -Myth-making stage and myth-using stage

UNIT II**10 Hours**

Ted Hughes Selections from Tales from Ovid i) Creation; Four Ages; Flood; Lycaon
ii) The Rape of Proserpina iii) Birth of Hercules iii) Echo and Narcissus iv) Pyramus and Thisbe

UNIT III**10 Hours**

General idea of Vedic, Epic and Puranic Mythology

UNIT IV**10 Hours**

Symbolism: Role of Symbols in myths, Symbols related to Sacrifice and other
Iconography, Understanding totems and taboos in tribal myths

UNIT V**11 Hours**

a. Indian Mythology by (Devdutt Pattanaik)-

i) A unit will focus on the in-depth psychological devotion to the perspectives of Indian
Mythology in Literature, Art, and Music

ii) Classical Mythology in Literature, Art, and Music (Focus Texts: For Classical
Language Study)

Text Books:

- Bauman, R. (Ed.). (1992). *Folklore, cultural performances, and popular entertainments: A communications-centered handbook*. Oxford University Press.
- Fenn, C. (1993). *Life history of a collection: the Tahltan materials collected by James A. Teit* (Doctoral dissertation, University of British Columbia).

Reference Books

- FRITZ, L. N. J., & HIGGINS, J. ANTHROPOLOGICAL THEORY AND EDUCATION..
- Tatar, M. (2019). *The Hard Facts of the Grimms' Fairy Tales: Expanded Edition* (Vol. 39). Princeton University Press.

E-Resources

- Bascom, William. 1965. *The Forms of Folklore: Prose Narratives* in *Journal of American Folklore* 78.: 3-20.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the processes involved in the creation and adaptation of myths, and their evolution over time.	K1,K2
CO-2	Apply the modern reinterpretation of the myth of King Midas, focusing on themes of transformation and consequences.	K3
CO-3	Familiarize students with key concepts, deities, and narratives from Vedic, Epic, and Puranic traditions in Indian mythology.	K4
CO-4	Explain the cultural significance of totems and taboos in tribal mythologies.	K5
CO-5	Compose how Indian mythology influences various artistic expressions and understand the psychological aspects embedded in these narratives.	K6

CO PSO MAPPING

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	2	2	0	2	2	2
CO4	3	3	2	3	2	2
CO5	3	3	3	2	3	2

High Correlation: 40% Medium Correlation: 57% Low Correlation: 0% No Correlation: 3%

ENGLISH FOR BUSINESS

UEND401

Semester : IV
Category : Elective / DSE 6
Class & Major : II B.A. English

Credits : 2
Hours/Week : 2
Total Hours : 26

COURSE OBJECTIVES:

CO.NO.	To enable the Students to
CO1	Learn business skills, giving presentations and meetings.
CO2	Cultivate general comprehension of business English, to provide them with practical business strategies and to enable them to appear professional and competent.
CO3	Enhance career prospects and become more competitive in the job market.
CO4	Apply oral and written language skills in a business context
CO5	Develop a comprehensive vocabulary through real, authentic resources

UNIT I**5 Hours**

Introduction to Business English

UNIT II**5 Hours**

Highlights/ Significance/Essentials of Business English for Effective Communication

UNIT III**5 Hours**

Needs of Business English, Leadership and Management.

UNIT IV**6 Hours**

The role of Business English in English language Learning-Education as an instrumental factor in learning Business English.

UNIT V**5 Hours**

Economic Development through Business English, Presentation skills.

Text Books

- Nabila, H. (2015). English for Specific Business Purposes. *University of Oran Faculty of Letters, Languages, and Arts Department of Anglo-Saxon Languages Section of English.*
- Nabila, H. (2015). English for Specific Business Purposes. *University of Oran Faculty of Letters, Languages, and Arts Department of Anglo-Saxon Languages Section of English.*

Reference Books

- Strapasson, G. (2015). *Needs analysis and english for business purposes* (Bachelor's thesis, Universidade Tecnológica Federal do Paraná)..
- Nickerson, C., & Planken, B. (2015). *Introducing Business English*. Routledge..

E -Resources

- <https:// English language skills for the future / Cambridge English.com>
- <https:// learnenglish.british council.com>
- <https://books.google.com>

COURSE OUTCOME

CO.NO.	On completion of the course, the students will be able to	Bloom's Level
CO1	Recognize common business communication formats, such as emails, reports, and presentations.	K1,K2
CO2	Understand and interpret written and spoken business communication, including memos, emails, and reports.	K3
CO3	Apply appropriate business writing conventions to compose effective emails, reports, and other professional documents.	K4
CO4	Critically assess the effectiveness of business communication strategies in different contexts.	K5
CO5	Evaluate the impact of cultural differences on business communication and adapt strategies accordingly.	K6

CO PSO Mapping

PSO\CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	1	0	1	2	2
CO2	3	0	0	1	3	2
CO3	3	2	0	0	3	2
CO4	3	3	0	1	3	2
CO5	3	3	0	0	3	2

**High Correlation: 33 % Medium Correlation: 27 % Low Correlation: 13 %
No Correlation: 27%**

UG III AND IV EVALUATION COMPONENTS OF CIA

SEMESTER	CATEGORY	COURSE CODE	COURSE TITLE	COMPONENT-III	COMPONENT-IV
III	Core Course - V	UENM311	British Literature-II	Assignment	Seminar
	Core Course – VI	UENM312	Introduction to Comparative Literature	Writing Papers Or Assignment	Seminar
	Elective Course 3 (Generic / Discipline Specific) -EC3	UENA305	Literary Genres and Forms	Assignment	Seminar
	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	UEND301	English for Communication	Assignment	Seminar
	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	UENU302	Content Writing for Marketing & Branding	Assignment	Mini Project- Individual Project (20 Pages)
IV	Core Course - VII	UENM411	American Literature-II	Assignment	Seminar
	Core Course - VIII	UENM412	World Literature in Translation	Assignment	Seminar
	Elective Course - EC4 (Generic)	UENA405	Myth and Literature	Assignment	Poster Presentation
	Skill Enhancement Course – SEC-6 (Discipline Specific)	UEND401	English for Business	Assignment	Seminar

DEPARTMENT OF ENGLISH (M.A.)
PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO. No	Upon Completion of these courses the undergraduate will be able to
PSO-1	Acquire advanced written and spoken communication skills, effectively composing complex arguments, analyzing nuances, and adapting styles to diverse audiences.
PSO-2	Demonstrate in-depth knowledge of literary history, theory, and scholarship, conducting complex research and presenting original interpretations confidently.
PSO-3	Reinforce mastery of curriculum development, critical thinking facilitation, and diverse teaching methodologies
PSO-4	Compare literature to other disciplines (history, philosophy, etc.), demonstrating intellectual breadth and appreciation for interdisciplinary approaches.
PSO-5	Determine leadership roles in academic or professional settings, contributing actively to scholarly communities and contributing original research or creative work.
PSO-6	Adapt a strong commitment to lifelong learning, adapting their skills and knowledge to evolving careers and societal demands.

PROGRAMME PROFILE M.A. (ENGLISH)

Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit Min/Max
I	Core Courses - I	PENM123	English Poetry	4	3
	Core Courses - II	PENM124	English Drama	4	3
	Core Courses - III	PENM125	English Fiction	4	3
	Core Courses - IV	PENM126	English Literature for Competitive Examinations	3	3
	Elective (Generic / Discipline Centric)- I	PENO101	Indian Writing in English	5	3
	Elective (Generic / Discipline Centric)- II	PENO102	Theatre Art	5	3
	Skill Enhancement Course SEC 1 – (NME)			3	2
	Skill Enhancement Online Course	PONL101	Online Course	2	2
Total				30	22
II	Core Courses – IV	PENM223	American Literature	5	4
	Core Courses – V	PENM224	Shakespeare Studies	5	4
	Core Courses –VI	PENM225	Post - Colonial Theory and Literature	5	4
	Core Industry Module	PENM204	Digital Media	4	3
	Elective (Generic / Discipline Centric)- III	PENO201	Approaches to English Language Teaching	4	3
	Elective (Generic / Discipline Centric)- IV	PENO202	A Glimpse of Nobel Laureates	4	3
	Skill Enhancement Course SEC 2(Discipline)	PEND201	Language and Linguistics	3	2
	Service Learning (IV)	PENX201		-	1
	Internship/Field visit(IV)	PINS201		-	2

Total				30	26
III	Core Courses -VII	PENM323	Contemporary Literary Criticism	5	4
	Core Courses -VIII	PENM324	Canadian Studies	5	4
	Core Courses –IX	PENM325	Literature of the Marginalized in India	5	4
	Core Industry Module	PENM304	Blog Writing	4	3
	Elective (Generic / Discipline Centric)-V	PENO301	Translation Studies	4	3
	Elective (Generic / Discipline Centric)-VI	PENO302	Functional English	3	3
	Skill Enhancement Course SEC 3 Interdisciplinary	PENI301	Forms of Short Poems	4	2
Total				30	23
IV	Core Courses – X	PENM423	Twenty First Century Millennial Literature and Culture	5	4
	Core Courses –XI	PENM424	Subaltern Studies	5	4
	Core Courses –XII	PENM425	Literature In Film And Media Studies	5	4
	Project with Viva-Voce	PENP401	Project and Viva-Voce	6	4
	Elective-Discipline Specific	PENO401	English Literature for NTA NET,SET & GATE	5	3
	Skill Enhancement Course–III (Proficiency skill)	PENC401	Research Methodology	4	2
	Internship/Field visit (IV)	PINS401	Internship		-/2
Total				30	21/23
Grand Total				120	92/94

CONTEMPORARY LITERARY CRITICISM

PENM323

Semester : III
Category : Core VII
Class & Major : II M.A. English

Credits: 4
Hours/Week: 5
Total Hours: 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Interpret the literary movements and literary theories.
CO-2	Apply the different schools in contemporary literary Criticism
CO-3	Examine the works of various literary critics, To demystify some key ideas and debates in contemporary literary criticism.
CO-4	Evaluate the prescribed texts and the literary theories
CO-5	Formulate the deep understanding of literary criticism

UNIT-I

13 Hours

Jacques Derrida : Structure, Sign and Play in the Discourse of Human Sciences

UNIT- II

13 Hours

M.H. Abrams : The Deconstructive Angel

Louis Althusser : Ideology and Ideological State Apparatuses

UNIT-III

13 Hours

Susan Sontag : Against Interpretation

Edward Said : Crisis (In Orientalism)

UNIT-IV

13 Hours

Michael Foucault : What is an Author?

Sigmund Freud : Creative Writers and Day Dreaming

UNIT-V

13 Hours

Roland Barthes : From Work to Text

Terry Eagleton : Capitalism, Modernism and Post Modernism

Text Books

- Eagleton, T. (2011). *Literary theory: An introduction*. John Wiley & Sons..

Reference Books

- Wood, N., & Lodge, D. (2014). *Modern criticism and theory: A reader*. Routledge.
- Lodge, D. (1972). *Twentieth Century Literary Criticism: A Reader*. Routledge.

E-Resources:

- <https://courses.lumenlearning.com/suny-britlit1/chapter/literary-criticism/>
- <https://www.atlassociety.org/post/deconstructing-derrida-review-of-structure-sign-and-discourse-in-the-human-sciences>
- <https://fs.blog/susan-sontag-against-interpretation/>
- <https://www.studocu.com/in/document/madurai-kamaraj-university/ma-english/h/the-deconstructive-angel/4517560>

- <https://www.britannica.com/biography/Roland-Gerard-Barthes>

COURSE OUTCOMES

CO No.	On completion of the course the students will be able to	Bloom's Level
CO-1	Understand a literary text by applying various critical theories.	K1,K2
CO-2	Develop analytical understanding of the subject matter.	K3
CO-3	Analyze a literary text with reference to socio-political issues	K4
CO-4	Evaluate critically and aesthetically the prescribed texts.	K5
CO-5	Appreciate a text at emotional, intellectual and aesthetic levels	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	3	3	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	2	3	2	2
CO4	3	3	2	2	2	2
CO5	2	2	2	2	2	3

High Correlation: 33 % Medium Correlation: 67 % Low Correlation: 0 %

CANADIAN STUDIES

PENM324

Semester : III
Category : Core VIII
Class & Major: II MA English

Credits : 4
Hours/Week: 5
Total Hours : 65

Course Objectives

CO No.	To enable the students to
CO-1	Expose the students to Canadian Social, Cultural, Historical and Aboriginal traditions
CO-2	Provide knowledge about the different trends in Canadian studies
CO-3	Develop a comprehensive overview of Canadian life and society, including such areas as geography, history, the political system, and Canada's culture and economy.
CO-4	Critically analyze and interpret selected Canadian literary works, considering themes, characters, and narrative techniques.
CO-5	Examine the portrayal of multiculturalism and diversity in Canadian literature.

UNIT I POETRY **10 Hours**

- P.K.Page : Adolescence
- A.M.Klein : Indian Reservation: Caughnawaga
- Marget Atwood : The Landlady

UNIT II CRITICISM **13 Hours**

- Linda Hutcheon : The Canadian Post-Modern
- Thomas King : Godzilla vs Post-Colonial

UNIT III SHORT STORY **12 Hours**

- Beatrice Culleton : In Search of April Rain tree
- Joesph Boyden : Born with a Tooth
- Thomas King : The Inconvenient Indian

UNIT IV DRAMA **15 Hours**

- George Ryga : Ecstasy of Rita Joe
- Tom Highway : Dry Lips Oughta Move to Kapuskasing

UNIT V FICTION **15 Hours**

- Thomas King : Truth and Bright water
- Michael Ondaatje : The Cat's Table

Text Books

- Ryga, G., & Crowell, C. (1971). *The Ecstasy of Rita Joe*. Vancouver, BC: Talonbooks.

Reference Books

- Atwood, M. (2002). *Negotiating with the dead: A writer on writing*. Cambridge University Press.
- Menhart, R. A. (2004). *Weaving the literary quilt: the layering of narrative in Thomas King's Truth & Bright Water* (Doctoral dissertation).

E -Resources

- <https://www.poetryfoundation.org/poets/margaret-atwood>
- <https://www.newyorker.com/magazine/2017/04/17/margaret-atwood-the-prophet-of-dystopia>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Demonstrate an understanding of the cultural and historical context shaping Canadian literature.	K1
CO-2	Apply knowledge of Canadian literary genres to analyze and categorize specific works	K2
CO-3	Evaluate how different literary devices contribute to the overall meaning and impact of a text.	K3
CO-4	Critically assess the representation of cultural diversity and multiculturalism in Canadian literature	K4
CO-5	Create original interpretations or analyses that connect multiple Canadian literary texts.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO – 3	PSO - 4	PSO – 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	3	2	2	2	2	2
CO3	3	3	2	2	2	2
CO4	3	3	2	2	2	2
CO5	3	2	2	2	3	2

High Correlation: 23% Low Correlation: 0% Medium Correlation: 77 %

LITERATURE OF THE MARGINALIZED IN INDIA

PENM325

Semester	: III	Credits	: 4
Category	: Core IX	Hours/Week	: 5
Class & Major	: II M.A. English	Total Hours	: 65
Course Objectives			

CO.NO.	To enable the students to
CO1	Remember the history of anti-caste and anti-discrimination discourses
CO2	Understand about the Dalit's uprising in the literary, social and cultural spheres
CO3	Examine the caste studies, reflecting upon the history of anti-caste struggle in India.
CO4	Structure an important dimensions to understanding political spheres in India
CO5	Measure the disciplines and covers a range of disciplines including history, sociology, ethnography, anthropology and literature.

UNIT I Introduction

13 Hours

What is Dalit Literature, Critique of Caste System, Dalit Consciousness, Emergence of literature of resistance, Dalit Aesthetics

UNIT II History and Theory of Dalit Uprising

13 Hours

Gail Omvedt : Dalits and Democratic Revolution in India

Ravikumar : Power of Invisibility

UNIT III Poetry

13 Hours

Koshal Parwar : Life

Namdeo Dhasal : Hunger

J.V. Pawar : Birds in Prison

Arun Kamble : Which language I should speak

Dr. Siddalingaiah : The Dalits are coming

UNIT IV Short Story

13 Hours

Anna Bhau Sathe : Gold from the grave

Baburao Bagul : When I hit my Caste

UNIT V: Fiction

13 Hours

Kalyan Rao : Untouchable Spring

U R Anantamurthy : Samskara

Text Books:

- Samuels, S., Bari, R., Behera, G. C., Borah, M., Dey, S., Al-Quaderi, G. G., ... & Vohra, S. (2017). *Multicultural and Marginalized Voices of Postcolonial Literature*. Rowman & Littlefield.

Reference Books:

- Souda, S. (2019). Life And Struggle Of The Dalits In Kalyan Rao's Untouchable Spring. *Literary Endeavour*, 10(1).

E - ReSources:

- www.ambedkar.org
- www.saxakali.org
- <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00487/full>
- <https://www.jstor.org/stable/2053672>
- <https://www.sciencedirect.com/science/article/abs/pii/S2214629620301079>

Course Outcomes:

CO. NO	On completion of the course, the students will be able to	Bloom's Level
CO 1	Understand the historical and political background of Caste	K1/K2
CO 2	Focus on understanding the dimensions of discriminations.	K3
CO 3	Analyze a literary text with reference to socio-political Issues	K4
CO 4	Evaluate the prescribed texts critically.	K5
CO 5	Expose the range of disciplines including history, sociology, ethnography, anthropology and literature.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO – 3	PSO - 4	PSO – 5	PSO - 6
CO1	3	2	2	2	2	3
CO2	3	2	2	2	2	2
CO3	3	3	2	3	2	2
CO4	3	3	2	2	2	2
CO5	2	2	2	3	2	2

High Correlation: 30% Low Correlation: 0%Medium Correlation: 70%

BLOG WRITING

PENM304

Semester : III
Category : Core Industry Module
Class &Major: II M.A English

Credits : 3
Hours/ Week : 4
Total Hours : 52

Course Objectives

CO No.	To enable the students to
CO-1	Acquire the key concepts, principles, and terminology related to blog writing.
CO-2	Interpret the purpose, audience, and impact of different blog genres and styles.
CO-3	Apply theoretical knowledge to craft engaging and informative blog posts for various audiences and purposes.
CO-4	Evaluate the effectiveness of blog content based on structure, style, audience engagement, and SEO principles.
CO-5	Develop original and creative blog posts that demonstrate a unique voice and brand identity.

UNIT I Introduction to Blog Writing

11 Hours

Definition and history of blogs, Different types of blogs (personal, professional, niche, etc.) Identifying your target audience and niche, choosing the right blogging platform, Setting up and customizing your blog

UNIT II Crafting Compelling Content

10 Hours

The art of headline writing, Writing captivating introductions and hooks, Structuring blog posts for clarity and flow, Different content formats (lists, how-tos, stories, etc.), Finding inspiration and overcoming writer's block.

UNIT III Writing Techniques and Style

10 Hours

Writing clear, concise, and engaging prose, Using storytelling and emotional appeal effectively incorporating humor, personality, and brand voice, Editing and proofreading for clarity and flow

UNIT IV Search Engine Optimization (SEO)

10 Hours

Understanding SEO basics and keyword research, Optimizing titles, Meta descriptions, and headers, writing for search engines without compromising quality, Internal linking and external linking strategies

UNIT V Building Your Audience and Promotion

11 Hours

Social media promotion strategies for blogs, Building an email list and engaging with subscribers, Guest blogging and collaboration opportunities, Tracking blog traffic and analyzing key metrics

Text Books:

- Beard, F., Petrotta, B., & Dischner, L. (2021). A history of content marketing. *Journal of Historical Research in Marketing*, 13(2), 139-158
- Brogan, C. (2010). *Social media 101: Tactics and tips to develop your business online*. John Wiley & Sons.

Reference Books

- American Psychological Association. (2019). Publication manual of the American Psychological Association, (2020). *American Psychological Association*, 428.

- Gratz, E. (2020). LibGuides: Chicago Manual of Style Guide (Chicago 17th Edition): Books.

E-Resources

- **Blog Writing for Beginners:** <https://copyblogger.com/>
- **Hemingway Editor:** <https://hemingwayapp.com/>
- **Google Analytics:** <https://marketingplatform.google.com/about/analytics/>

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identify the target audience and purpose of different blogs.	K1,K2
CO-2	Develop effective blog writing strategies, including headline writing, content structuring, and multimedia integration	K3
CO-3	Evaluate the effectiveness of their own blog writing and the work of others.	K4
CO-4	Compare different blogging platforms and choose the most suitable one for their needs.	K5
CO-5	Create a series of original blog posts showcasing their writing skills, creativity, and understanding of SEO principles.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	3	2	2	2	2	2
CO3	3	2	2	2	2	2
CO4	2	2	2	2	0	2
CO5	3	2	2	2	2	2

**Correlation: 10% Medium Correlation: 87% Low Correlation: 0 %
No Correlation: 3 %**

TRANSLATION STUDIES

PENO301

Semester : III Credits : 3
Category : Elective V Hours/Week : 4
Class & Major : II M.A. English Total Hours : 52

Course Objectives

CO.NO.	To enable the students to
CO1	Define a glimpse of the rich diversity of Indian culture and literature
CO2	Understand the knowledge about regional languages through representative texts in English translation
CO3	Analyze the theories and techniques of translation
CO4	Develop an insight into the problems of a translator; to provide them with a practical knowledge of a translator's job.
CO5	Assess the nuances of translations

UNIT I Introduction to Translation Studies**10 Hours**

Introduction to Translation Studies, Definition and scope of Translation, History of Translation, Types of Translation, Decoding and Recoding, Cultural issues in Translation, Problems of Equivalence and Untranslatability

UNIT II Poetry**10 Hours**

Balamani Amma : To My Daughter (The Oxford Anthology of Modern Indian Poetry eds. Vinay Dharwadkar and A K Ramanujan) Kuty Revathi : Naam Deivathaigal Alla

UNIT III Drama**12 Hours**

Indira Parthasarathy : The Legend of Nandan (New Delhi, OUP, 2003)
Mahasweta Devi : Rudaali

UNIT IV Short Story**12 Hours**

PudumaiPithan - "Teaching"
Sundaram Ramasamy - "Sita Brand Soapnut Powder"
Chudamani - " Hersel

Unit V Analysis of a Translated Text and Practice:**8 Hours**

Novel: Ambai - Veetin Moolaiyil Oru samaiyalara
Thirukkural : Chapters 11, 13, 19, 44

Text Books

- Tharu, S. J., & Lalita, K. (Eds.). (1991). *Women Writing in India: 600 BC to the early twentieth century* (Vol. 1). Feminist Press at CUNY.

References Books

(Latest editions, and the style as given below must be strictly adhered to)

- Bandia, P. F. (2010). Post-colonial literatures and translation. *Handbook of translation studies, 1*, 264-269.
- Amit, C. (2001). The Picador Book of Modern Indian Literature.
- Pai, N. (2018). Language and translation in Dalit literature. In *Dalit literatures in India* (pp. 86-102). Routledge India.

E- Sources

- https://en.wikipedia.org/wiki/Translation_studies#:~:text=Translation%20studies%20is%20an%20academic,of%20study%20that%20support%20translation.
- <https://www.tandfonline.com/toc/rtrs20/current>

Course Outcomes

CO.NO	On completion of the course the students will be able to	Bloom's Level
CO1	Understand the systematic study of translation	K1, K2
CO2	Construct the better dimensions of language and its nuances essential for translation	K3
CO3	Develop exposure to effective translation	K4
CO4	Compare the skills as well as the politics of translation.	K5
CO5	Create knowledge in the regional languages through representative texts in English translation	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO – 3	PSO - 4	PSO – 5	PSO - 6
CO1	2	3	2	2	2	2
CO2	3	2	2	2	2	2
CO3	2	3	2	2	2	2
CO4	3	3	2	2	2	3
CO5	3	3	2	3	3	2

High Correlation: 67 % Low Correlation: 0% Medium Correlation: 33%

FUNCTIONAL ENGLISH

PENO302

Semester : III
Category : Elective/ Generic Specific
Class & Major: II MA English

Credits: 3
Hours/Week: 3
Total Hours: 39

Course Objectives

CO.NO	To enable the students to
CO1	Understand the grammatical accuracy. Vocabulary acquisition and comprehension.
CO2	Apply acquired language skills to analyze and interpret diverse texts.
CO3	Develop interpersonal skills, argumentative abilities and the capacity to express ideas coherently in both formal and informal settings.
CO4	Demonstrate advanced language proficiency through the creation of original written and spoken content.
CO5	Critically evaluate the student's proficiency in utilizing digital tools and platforms to support functional English Communication in contemporary contexts.

UNIT I Public Speaking

7 Hours

Characteristics of a good speaker, Methods of Speaking, Preparation and Delivery of Speech, public speaking exercises.

UNIT II Written skills and Speech for Situations

7 Hours

Developing coherence and cohesion, Editing and revising written work, Speech to inform, Speech to Persuade, Speeches for Special occasions

UNIT III Occupational Skills

7 Hours

Email, Official memo, Business communication and writing email etiquette.

UNIT IV Interview Skills

7 Hours

Prepare and practice for Interviews, Some General Questions in an Interview, Profile Writing for a Job, Presentation Skills, and Resume.

UNIT V Interpersonal Skills& Digital Literacy in English

8 Hours

Team Development, Negotiation, Navigation and evaluating online content, Using

digital tools for effective communication.

Text Book:

- Subrahmanyam, G., & Mohan, V. K. (2009). *PERSONALITY DEVELOPMENT Planning Your Success in Campus Interviews and Job Fairs*. Excel Books India.
- Mitra, B. K. (2006). *Effective technical communication: A guide for scientists and engineers*. Oxford University Press, USA..

Reference Book:

- Dietl, D. (1986). JOB Fair Finds Key to Success. *Journal of Rehabilitation*, 52(2), 11.
- Lock, G. (1995). *Functional English grammar: An introduction for second language teachers*. Cambridge university press.

E- Sources:

- Team Development - <https://blog.vantagecircle.com/team-development/5.Relationship and Communication> <https://2012books.lardbucket.org/books/a-primer-oncommunication->
- <https://careerwise.minnstate.edu/careers/occupational- skills.html>
- <https://in.indeed.com/career-advice/interviewing/interviewing-skills>

COURSE OUTCOME

CO.NO	On Completion of the course, the students will be able to	Bloom's Level
CO-1	Demonstrate a foundational understanding of essential grammatical structures, vocabulary, and language conventions.	K1
CO-2	Analyze and interpret complex texts, engage in critical discussions and articulate ideas effectively in both written and spoken forms.	K2
CO-3	Exhibit creativity, originality, and precision in the use of language.	K3
CO-4	Attain a mastery of functional English through advanced analysis.	K4
CO-5	Evaluate written and spoken content, reflecting a profound mastery of language in various professional and academic contexts.	K5 & K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	3	2	2	2	2	2
CO3	3	2	2	2	2	2
CO4	3	2	2	2	2	2
CO5	3	3	2	2	2	2

High Correlation: 17 %Medium Correlation: 83% Low Correlation: 0%

FORMS OF SHORT POEMS

PENI301

Semester : III
Category : SEC 3
Class & Major : II M.A. English

Credits : 2
Hours/Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO.NO.	To enable the students to
CO1	Understand various forms of short poetry, haiku, sonnet, free verse, structures and characteristics.
CO2	Analyze the effective use of poetic devices such as imagery, metaphor, simile, symbolism, alliteration, assonance, and onomatopoeia in short poems.
CO3	Develop their unique poetic voices, experimenting with different styles, tones, and perspectives in their own compositions
CO4	Explore a diverse range of poets and perspectives, voices from marginalized communities
CO5	Experiment with innovative techniques and approaches to short poetry composition.

UNIT I:

11 Hours

Introduction to Short Poems Tamil and English poem formats - Definitions - Modern poetry
Short poems - Introduction - Division of poems - Content - Structural elements

UNIT II:

11 Hours

Origin of Haiku - Haiku development - Haiku pioneers - Haiku in Tamil and English - philosophy - Haiku writing techniques - Haiku themes.

UNIT III:

10 Hours

Origin of Senryou - Senryou development - Kari Senryou - Reasons for Senryou's name - Senryou in Tamil and English - Senryou writing techniques - Senryou themes.

UNIT IV

10 Hours

Limeric - Characteristics of Limeric - Limeric structure - Limeric development stages - Limeric writing techniques - Limeric themes - Haiku writing techniques - Haiku themes

UNIT V

10 Hours

To introduce and teach the methods of poetry through concept, form, emotion & Imagination.

Text Books

- Addiss, S. (2022). *The art of haiku: Its history through poems and paintings by Japanese masters*. Shambhala Publications.
- Wilden, E. (2006). *Literary Techniques in Old Tamil Caṅkam Poetry: The Kuruntokai* (Vol. 15). Otto Harrassowitz Verlag.

References Books

- Ferrar, J. (1787). *The History of Limerick*. A. Watson, & Company.
- Dirx, J. M. (2001). The power of feelings: Emotion, imagination, and the construction of meaning in adult learning. *New directions for adult and continuing education*, 2001(89), 63.

E-Resources

- <https://thehaikufoundation.org/omeka/files/original/50a61193bc1caf7a3c86b9acc9>

- <https://www.edb.gov.hk/attachment/en/curriculum-development/kla/eng-edu/references-resources/Learning%20and%20teaching%20of%20poetry.pdf>

Course Outcomes

CO No.	On completion of this course, students will be able to	Bloom's Level
CO1	Identify common poetic devices, such as imagery, metaphor, simile, symbolism, alliteration, assonance, and onomatopoeia, within short poems.	K1, K2
CO2	Explain the use of different poetic devices in short poems and how they contribute to the overall meaning and effect.	K3
CO3	Interpret the themes and messages conveyed in short poems, considering the cultural and historical contexts.	K4
CO4	Apply knowledge of poetic forms and devices to analyze and interpret short poems independently.	K5
CO5	Assess the cultural and historical significance of selected short poems within the context of literary traditions and movements.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	2	2	2	2	2
CO4	2	2	2	2	3	2
CO5	3	3	2	2	3	2

High Correlation: 23% Low Correlation: 0% Medium Correlation: 77%

TWENTY FIRST CENTURY MILLENNIAL LITERATURE AND CULTURE

PENM423

Semester : IV

Credits : 4

Category : Core X

Hours : 5

Class & Major : II M.A. English

Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Interpret various aspects of new studies in twenty first century millennial literature.
CO-2	Apply important ideas, movements and systems of thought that effectively contributes to the rich diversity of 21 st century life of people at the global level.
CO-3	Identify the possibilities for multidisciplinary analysis of literary texts.
CO-4	Analyze literary texts by employing appropriate interdisciplinary theories.
CO-5	Evaluate the viability of interdisciplinary analyses of literary and cultural forms.

Unit -I: Ocean Studies

13 Hours

Amitav Ghosh : The Hungry Tide

Unit – II: Animal Studies

13 Hours

Margo De Mello : Human Animal Studies” from *Animals and Society*

Indra Sinha : “What is it like to be a trope?” from *Literature and Animal Studies*

Unit - III: Medical Humanities

13 Hours

Thomas R. Cole et al : “Introducing Medical Humanities” from *Medical Humanities: An Introduction*

Dan Millman : *Way of the Peaceful Warrior*

Unit – IV: Climate Studies

13 Hours

Introduction to Climate Change and Studies

Barbara Kingsolver : *Flight behavior*

Unit – V: Disability Studies

13 Hours

Lennard J. Davis : “Introduction: Disability, Power and Culture” From the *Disability Studies Reader*.

Clarke Barker & Stuart Murray : “Introduction: On Reading Disability in Literature” from *The Cambridge Companion to Disability Studies*

Text Books:

- Ghosh, A. (2005). *The hungry tide*. Houghton Mifflin Harcourt.
- Davis, L. J. (2016). *The disability studies reader*. Routledge..
- Barker, C. F., & Murray, S. F. (2017). Introduction: On reading disability in literature.
- Kingsolver, B. (2012). *Flight Behaviour: Author of Demon Copperhead, Winner of the Women's Prize for Fiction*. Faber & Faber
- Millman, D. (2000). *Way of the peaceful warrior: A book that changes lives*. HJ Kramer.

References Books:

- Bleakley, A. (2015). *Medical humanities and medical education: how the medical humanities can shape better doctors*. Routledge.
- DeMello, M. (2013). *Body studies: An introduction*. Routledge.
- Nocella, A. J. (2014). Defining critical animal studies: An intersectional social justice approach for liberation.

E-Resources:

- <http://www.criticalanimalstudies.org/students-for-cas/journal-for-critical-animal-studies/archives/>
- <http://www.jstor.org/stable/25614299>.

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom’s Level
CO-1	Gain exposure to the emerging trends in 21 st century millennial literature.	K1
CO-2	Effectively understand their social responsibility	K2
CO-3	Analyze contemporary issues and its immediate requirement.	K3
CO-4	Be equipped in the interdisciplinary theories.	K4
CO-5	Appreciate the viability of interdisciplinary analyses of literary and cultural forms.	K5

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO – 3	PSO - 4	PSO – 5	PSO - 6
CO1	3	2	2	2	2	3
CO2	3	2	2	2	2	3
CO3	2	3	2	2	2	3
CO4	2	2	2	3	2	3
CO5	3	2	2	3	2	3

High Correlation: 37% Low Correlation: 0% Medium Correlation: 63%

SUBALTERN STUDIES

PENM424

Semester : IV Credits : 4
Category : Core Courses –XI Hours/Week : 5
Class& Major : II M.A. English Total Hours : 65

COURSE OBJECTIVES:

CO.NO.	To enable the Students to
CO1	Understand the issues related to socially excluded and marginalized groups
CO2	Promote a systematic and informed discussion of subaltern themes in the field of South Asian studies.
CO3	Analysis of literary texts in Subaltern lens
CO4	Examine the defined role of social constructions affecting the space of the marginalized
CO5	Create research and academic knowledge of the domain

UNIT I Poetry Detailed

13 Hours

Imayam : You and I The Rattle and the Cow that Changed

Rokade, L.S. : To Be or Not to Be Born Jagtap, Bapurao – This country is

Broken

Sirumalesh, K.V. : The Untouchables

Claude Mckay - : If we must Die Langston Hughes – Dinner Guest: Me

UNIT II Prose – Detailed

13 Hours

Martin Luther King (Jr) : I Have a Dream

Non-Detailed

Gayatri C.Spivak : Can the Subaltern Speak

UNIT III Drama – Detailed

13 Hours

C.T. Indra : Nandan

Non - Detailed

Vijay Tendulkar : Kanyadan

UNIT IV Fiction**13 Hours**

Malala Yousafzai with Christina Lamb : I am Malala

Sivagami : The Grip of Change

UNIT V Short Story**13 Hours**

Premchand : The Shroud

Mahasweta Devi : Breast Stories

Text Books

- Guha, R., & Spivak, G. C. (Eds.). (1988). *Selected subaltern studies*. Oxford University Press.
- Tendulkar, V. (2018). *Kanyadan* (Vol. 1). Vani Prakashan.
- Spivak, G. C. (2023). Can the subaltern speak?. In *Imperialism* (pp. 171-219). Routledge.

Reference Books

- Ludden, D. E. (Ed.). (2003). *Reading subaltern studies: critical history, contested meaning, and the globalisation of South Asia*. Orient Blackswan.
- Bhagwan, P. M. (2015). Reinterpreting Mahasweta: A Critical Study of Breast Stories. *Epitome Journals: International Journal of Multidisciplinary Research*, 1(2), 1-9.
- Premchand, M. (2004). The Shroud.
- Nayar, P. K. (2006). Bama's Karukku: Dalit autobiography as testimonio. *The Journal of Commonwealth Literature*, 41(2), 83-100.
- Syamsiah, N. (2016). Women In Gender (Critical Discourse Analysis on Novel I am Malala by Malala Yousafzai and Christina Lamb). *English Education: Jurnal Tadris Bahasa Inggris*, 9(2), 344-365.

E Resources

- <https://home.csulb.edu/~ssayeghc/theory/subalternstudies.htm#:~:text=Subaltern%20Studies%20emerged%20around%201982, had%20not%20been%20heard%20previous.>
- <https://scholarblogs.emory.edu/postcolonialstudies/2020/02/17/subaltern-studies/>
- <http://magazines.odisha.gov.in/Orissareview/2014/Nov/engpdf/82-87.pdf>
- https://www.sas.upenn.edu/~dludden/ReadingSS_INTRO.pdf

COURSE OUTCOME

CO.NO.	On completion of the course the students will be able to	Bloom's Level
CO1	Interpret the diverse concepts that address issues of subalterns.	K1/K2
CO2	Develop the meaning and nature of the Subaltern history.	K3
CO3	Examine various subaltern texts	K4
CO4	Evaluate the sources and structures of social inequalities.	K5
CO5	Develop strategies to deal with Marginalized issues successfully.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	3	3	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	2	2	2	2
CO4	3	2	2	3	2	2
CO5	3	2	2	2	3	2

High Correlation: 33% Low Correlation: 0% Medium Correlation: 67%

LITERATURE IN FILM AND MEDIA STUDIES

PENM425

Semester : IV
Category : Core Courses –XII
Class &Major: II M.A English

Credits : 4
Hours/ Week : 5
Total Hours:65

Course Objectives

CO No.	To enable the students to
CO-1	Understanding the bond between the films and literature
CO-2	Identify fundamental concepts in film analysis
CO-3	Analyze the literary texts in comparison with the films.
CO-4	Critically appreciate films in the background of literary theories.
CO-5	Evaluate the film adaptation to its source material, considering changes in plot, character, and themes.

UNIT I

13 Hours

The Language of Film: Sings and Syntax

UNIT II

13 Hours

Train to Pakistan and the adaptation train to Pakistan

UNIT III

13 Hours

Kabuliwala and its Adaptation Kabuliwala

UNIT IV

13 Hours

Macbeth and its Adaptation Maqbool

UNIT V

13 Hours

The 3 Mistakes of my Life and Its Adaptation Kai Po Che
Movie Review

Text Books:

- Metz, C. (2011). *Language and cinema* (Vol. 26). Walter de Gruyter.

Reference Books

- Bhardwaj, N. From Paper To Screen: An Empirical Study Onscreen Adaptations From Literature With Reference to the Guide, Train To Pakistan And pinjar.
- Nundy, T. Cinematic Version Of Tagore's Short Stories By Anurag Basu. *Teaching And Learning Language And Literature In The Digital Era: Opportunities And Challenges*.
- Zhuang, L., Jing, F., & Zhu, X. Y. (2006, November). Movie review mining and summarization. In *Proceedings of the 15th ACM international conference on Information and knowledge management* (pp. 43-50).

E-Resources

- https://ijels.com/upload_document/issue_files/10IJELS-10920209-Adaptation.pdf
- <https://www.proquest.com/openview/8a8f039ef3b1232a4d428ad5e1f53a7f/1?pq-origsite=gscholar&cbl=1316371>

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Acquire Practical knowledge about technicalities of filmmaking.	K1
CO-2	Build knowledge about in depth analysis of the New Hollywood era	K3
CO-3	Explore the history of world cinema with a focus on global perspectives	K4
CO-4	Evaluate the evolution and characteristics of cinema	K5
CO-5	Critically analyze the adaptation of literature to cinema	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	3	3	2	2	2	2
CO3	2	2	2	3	2	2
CO4	3	2	2	2	2	2
CO5	3	3	2	2	2	2

High Correlation: 20% Low Correlation: 0 % Medium Correlation: 80%

ENGLISH LITERATURE FOR NTA, NET, SET & GATE PEN0401

Semester : VII
Category : Elective 1
Class & Major : II MA English

Credits : 3
Hours/Week : 5
Total Hours : 65

Course Objectives

CO No.	To enable the students to
CO-1	Comprehending the nuances and question pattern to get through NET, SET and Gate Exams.
CO-2	Evaluating the knowledge of literature.
CO-3	Repeated practice to attend MCQs
CO-4	Profound understanding about the various movements in English Literature
CO-5	Tracing the growth of English literature and literary forms

UNIT I

10 Hours

Teaching and Research Aptitude

UNIT II History of English Literature

13 Hours

The Elizabethan Age / Chaucer to Shakespeare; The Jacobean Age; The Restoration Period; The Augustan Age; The Romantic Age; The Victorian Age; The Twentieth Century (Modernism & Postmodernism) /Contemporary Period

UNIT III American and Non-British Literatures

12 Hours

Historical Perspective and Background; Colonization, Colonizers and the Colonized;

Commonwealth Literature; Subaltern Literature; Third World Literature. American Writers: Walt Whitman, Ralph Waldo Emerson, H.D. Thoreau, Emily Dickinson, Edgar Allan Poe

UNIT IV Literary Theory and Criticism

15 Hours

Plato, Aristotle, Horace, Longinus, Philip Sidney, John Dryden, Alexander Pope, Samuel Johnson, Thomas Carlyle, John Stuart Mill, Karl Marx, Friedrich Nietzsche, Mathew Arnold, T.S. Eliot, Northrop Frye, F.R. Leavis, I.A. Richards, Jacques Lacan, Carl Gustav Jung, Simone de Beauvoir

UNIT V Literary Forms

15 Hours

Rhetoric and Prosody, Figures of Speech: Alliteration, Antithesis, Apostrophe, Assonance, Metaphor, Simile, Paradox, Pun, Synecdoche, Metonymy, Hyperbole and Oxymoron, Rhyme and Metre, Rhythmic Patterns and Literary Terms

Text Books

- Harpreet Kaur. Oxford NTA –UGC Paper I FOR NET/SET/JRF: Teaching and Research Aptitude. Oxford, 2020
- Carter, R., & McRae, J. (2016). *The Routledge history of literature in English: Britain and Ireland*. Routledge.

Reference Books

- Srinivasa Iyengar, K. R. (1989). *Indian writing in English*. Sterling Publishers Private Limited.
- Milevoj, N. (2015). *African American literature: Slave narrative* (Doctoral dissertation, University of Rijeka. Faculty of Humanities and Social Sciences. Department of English Language and Literature).

Course Outcomes :

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the nuances of competitive exams	K1
CO-2	Succeed with ease in competitive exams.	K2
CO-3	Effectively attempt MCQs	K3
CO-4	Gain profound understanding about the various movements in English Literature	K4
CO-5	Demonstrate the gained knowledge in competitive exams	K6

CO PSO Mapping:

PSO /CO	PSO - 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6
CO1	2	2	2	2	2	2
CO2	2	2	2	2	2	2
CO3	3	3	2	2	2	2
CO4	3	3	2	2	2	2
CO5	3	3	2	2	2	2

High Correlation: 20% Low Correlation: 0% Medium Correlation: 80%

RESEARCH METHODOLOGY

PENC401

Semester : IV
Category : SEC (Proficiency Skill)
Class & Major : II M.A. English
Course Objectives

Credits: 2
Hours/Week: 4
Total Hours: 52

CO.NO.	To enable the students to
CO1	Understand the basic concepts of research using various methodologies.
CO2	Identify appropriate research topics
CO3	Select appropriate research problem and parameters
CO4	Prepare Project Proposal (To Undertake A Project)
CO5	Organize and conduct research (Advanced Project) in a more appropriate manner and write a research report.

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY

11 Hours

Meaning of research- Objective of Research- Motivation in Research-Types of Research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, and Conceptual vs. Empirical- Research Approaches- Significance of Research - Research Methods versus Methodology.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN

10 Hours

Research Problem- Selecting Research Problem- Necessity of Defining a Problem- Techniques of Defining Problem- Formulation of Research Problem, Objectives of Research Problem. Meaning of Research Design- Need for Research Design- Important Concept Related to Research Design- Different Research Designs - Basic Principles of Experimental Design; Important Experimental Design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS

10 Hours

Census And Sample Surveys- Characteristics of Good Sample Design- Different Types of Sample Designs- Techniques of Selecting a Random Sample-Accepts of Method Validation- Observation and Collection of Data- Methods of Data Collection - Sampling Methods- Data Processing and Analysis Strategies and Tools.

UNIT IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR

10 Hours

Interpretation and Report Writing- Meaning of Interpretation; Techniques of Interpretation; Precautions in Interpretation; Significance of Report Writing, Layout of Research Report, Types of Reports.

Ethics-Ethical Issues, Related to Research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the Patent System - Basic, Principles and General Requirements of Patent Law.

UNIT V DOCUMENTATION

10 Hours

Language and Style in Research Writing- Formatting Research Documents- MLA

Style- Bibliographies, Webliographies, Index-Quotation & Translation (In- text & end citation)-
 Body of a thesis- Summation- Work cited or consulted- Revising - Proof reading- Parenthetical
 Documentation.

Text books

- Kumari, S. K. V., Lavanya, K., Vidhya, V., Premila, G. A. D. J. S., & Lawrence, B. (2023). *Research methodology* (Vol. 1). Darshan Publishers.
- Gibaldi, J. (1995). *MLA handbook for writers of research papers*. Modern Language Association of America, 10 Astor Place, New York, NY 10003-6981..

Reference Books

- Zidane, R. (2015). Research methodology in education: basic principles and procedures. *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, 13(04), 53-81.
- Singh, Y. K. (2006). *Fundamental of research methodology and statistics*. New Age International.
- Kheider, M. O. H. A. M. E. D. (2016). Master 1 research methodology syllabus.
- Sadasivam, S. K., & Mohammed Jaabir, M. S. (2008). IPR, Biosafety and Biotechnology Management
- Bindner, D. (2010). *A student's guide to the study, practice, and tools of modern mathematics*. CRC Press.

Course Outcomes:

CO. NO	On completion of the course, the students will be able to	Bloom's Level
CO 1	Interpret and articulate the differences between various research methodologies and designs.	K1/K2
CO 2	Analyze and critique literature relevant to a chosen research topic, identifying gaps and research questions.	K3
CO 3	Integrate various research methods to design a cohesive and effective research study.	K4
CO 4	Apply research methods to real-world scenarios or practical research projects.	K5
CO 5	Evaluate the ethical considerations involved in a research study, proposing appropriate measures.	K6

CO PSO Mapping

PSO /CO	PSO - 1	PSO - 2	PSO – 3	PSO - 4	PSO – 5	PSO - 6
CO1	3	3	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	2	2	2	2	2
CO4	3	3	2	2	2	2
CO5	3	2	2	2	2	3

High Correlation: 30% Low Correlation: 0% Medium Correlation: 70 %

PG III AND IV EVALUATION COMPONENTS OF CIA

SEMESTER	CATEGORY	COURSE CODE	COURSE TITLE	COMPONENT-III	COMPONENT-IV
III	Core Courses – VII	PENM323	Contemporary Literary Criticism	Writing poems	Seminars
	Core Courses – VIII	PENM324	Canadian Studies	Assignment	seminar
	Core Courses – IX	PENM325	Literature of the Marginalized in India	Assignment	Seminar
	Core Industry Module	PENM304	Blog Writing	Assignment	Creating a Blog
	Elective (Generic Discipline Centric)-V	PENO301	Translation Studies	Assignment	Translate Short Story & Publish
	Elective (Generic Discipline Centric)-VI	PENO302	Functional English	Assignment	Seminar
	Skill Enhancement Course SEC 3 Interdisciplinary	PENI301	Forms of Short Poems	Assignment	Subtitle for Movie/ Short Film
IV	Core Courses – X	PENM423	Twenty First Century Millennial Literature and Culture	Paper Presentation	Seminar
	Core Courses – XI	PENM424	Subaltern Studies	Assignment	seminar
	Core Courses – XII	PENM425	Film and Media Studies	Paper Presentation	Short Film
	Elective-Discipline Specific	PENO401	English Literature for NTA NET,SET & GATE	Group Discussion	Prepare a Question Bank
	Skill Enhancement Course–III (Proficiency skill)	PENC401	Research Methodology	Assignment	Paper Presentation & Publication

DEPARTMENT OF BUSINESS ADMINISTRATION

PREAMBLE

UG: Programme profile & the syllabi of courses offered in semester III and IV along with III and IV evaluation components (with effect from 2023 – 2026) batch onwards.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of the Programme, the students will be able to
PSO-1	Understand and remember the concepts of various disciplines of management, economics, accounting, marketing, finance, human resource and corporate governance.
PSO-2	An ability to apply conceptual foundations of management to solve practical decision-making problems.
PSO-3	Execute technical competence in domestic and global business through the study of various dimensions in the field of business studies.
PSO-4	Develops overall personality through proper education skill enhancement courses & inculcate human values.
PSO-5	Creating the ability to understand the impact of managerial decisions on global economic and environmental context.
PSO-6	Acquire Entrepreneurial traits start to manage their own innovative business successfully

COURSE PROFILE BUSINESS ADMINISTRATION

Semester	Part	Category	Course Code	Course Title	Hours/Week	Credit
I	I	Language: Tamil/Hindi / French	UTAL110/ UHIL101/ UFRL101	General Tamil –I / Hindi I / French I	5	3
	II	English	UENL111	General English I	5	3
	III	Core Course I	UBAM101	Principles of Management	5	4
		Core Course II	UBAM102	Accounting for Managers I	5	4
		Allied – Discipline Non-Specific Elective- I	UBAA101	Managerial Economics	4	3
	IV	Foundation Course	UBAF101	Office Management	2	2
		Skill Enhancement course – NME I / SEC I			2	2
		Ability Enhancement Compulsory Course (AECC 1)- Soft Skill			2	2

				Total	30	23
II	I	Language: Tamil/Hindi / French	UTAL210/ UHIL102/ UFRL102	General Tamil –II / Hindi II / French II	5	3
	II	English	UENL211	General English II	5	3
	III	Core Course III	UBAM203	Business Communication	5	4
		Core Course IV	UBAM204	Accounting for Managers II	5	4
		Allied II / GE II	UBAO202	International Trade	4	3
		Internship/Industrial Training	UINS201	Semester vacation 30 Hrs / Summer vacation 60 Hrs	-	-/2
	IV	Skill Enhancement course - SEC –II (Non Major Elective)			2	2
		Skill Enhancement course - SEC –III Discipline / Subject Specific)	UBAD201	Integrated Marketing Communications	2	2
		(AECCII) Soft Skill– II	USKS203	Soft Skill – II	2	2
	V	Extension Activity/ Physical Education/NCC			-	1/2
VI	Value Added Course			-	-/2	
				Total	30	24/29
III	I	Language: Tamil/Hindi / French	UTAL310/ UHIL103/ UFRL103	General Tamil –III / Hindi III / French III	5	3
	II	English	UENL311	General English III	5	3
	III	Core Course V	UBAM305	Organizational Behaviour	4	4
		Core Course VI	UBAM306	Marketing Management	4	4
		Allied III / GE III	UMAA301	Business Statistics	4	3
	IV	Skill Enhancement course - NME IV / SEC IV Discipline / Subject Specific)	UBAD301	Company law and secretarial practices	2	2
		Skill Enhancement course- NME V / SEC V	UBAU301	Startup and venture management	2	1

		Entrepreneurial				
		Ability Enhancement Compulsory Course (AECCIII)Soft Skill– III	USKS303	Soft Skill-3	2	2
		Value Education	UGEV301		2	2
		Total			30	24
IV	I	Language: Tamil/Hindi / French	UTAL410/ UHIL104/ UFRL104	General Tamil –IV / Hindi IV/ French IV	5	3
	II	English	UENL411	General English IV	5	3
	III	Core Course VII	UBAM407	Human Resource Management	5	4
		Core Course VIII	UBAM408	Management Information system	5	4
		Allied IV / GE IV	UMAA410	Quantitative Techniques for Business	4	3
		Online course	UONL401		2	2
		Internship/Industrial Training	UINS401		-	-/2
	IV	Skill Enhancement course- NME VI / SEC VI- Discipline specific	UBAD401	Talent Management	2	2
		Ability Enhancement Compulsory Course (AECC– IV) - Soft Skill– IV	USKS403	Soft Skill – 4	2	2
	V	Extension Activity/ Physical Education/NCC			-	-/2
VI	Value Added Course			-	-/2	
		Total			30	23/29
V	III	Core Course IX	UBAM509	Advertising Management and Sales Promotion	5	4
		Core Course X	UBAM510	Research Methodology	5	4
		Core Course XI	UBAM511	Operations Management	5	4
		Allied V / GE V	UBAA505	Digital Marketing	5	3
		Allied V / GE V	UBAA506	Industrial Relations	4	3
			UBAA507	Financial Literacy		
Project	UBAP501	Project with Viva - Voce	4	4		

V	IV	Environmental Studies	UGEV501		2	2
		Total			30	24
VI	III	Core Course XII	UBAM612	Materials Management	5	4
		Core Course XIII	UBAM613	Services Marketing	5	4
		Core Course XIV	UBAM614	Business Taxation	5	4
		Allied VI / Discipline Elective VI	UBAO608	Consumer Behaviour	6	4
			UBAO609	Competency Mapping		
			UBAO610	Security Analysis & Portfolio Management		
	Allied VII / Discipline Specific VII	UBAO611	Logistics and Supply Chain Management	5	3	
		UBAO612	E-Business			
	III	Comprehensive Viva-Voce			-	1
		Internship / Industrial Training (semester vacation 30 Hrs/) UINS601	-	-	-	-/2
		Professional Competency Enhancement	UBAC601	Quantitative Aptitude I And Quantitative Aptitude II (2 hours each)	4	2
V	Extension Activity Physical Education/NCC				-	-/2
VI	Value Added Course				-	-
		Total			30	22/26
		Overall Total			180	140/155

COURSES OFFERED TO OTHER DEPARTMENTS

NON MAJOR ELECTIVES (NME)

Semester	Part	Category	Course Code	Course Title	Hour/Week	Credit Min/Max
I	IV	Non-Major Elective-I	UBAE101	Basics of event management	2	2
II	IV	Non-Major Elective-II	UBAE202	Managerial skill development	2	2
II	IV	Non-Major Elective-II	UBAE203	Business etiquette and corporate grooming	2	2

EXPERIENTIAL LEARNING

(Only for Interested Students)

Course mapping				Collaborating agency- Small Scale Industries		
Semester	Course Code	Course Title	Assessment	Industry Agency	Hour/Days / Month	Mode of Evaluation
III	UBAM307	Entrepreneurial Development	Component III	Shabana Pottery Industry	5 Days	Reflection
V	UBAM618	Service Marketing	Component IV	Vell Biscuits pvt, ltd, Pondicherry	5 Days	Reflection

ORGANISATIONAL BEHAVIOUR UBAM305

Semester : III
Category : Core VI
Class & Major: II BBA.
Course Objectives:

Credit : 04
Hours / Week : 04
Total hours : 52

CO No.	To enable the students to:
CO 1	Understand the extensive knowledge of OB.
CO 2	Examine awareness of job satisfaction.
CO 3	Identify the importance of workplace counseling.
CO 4	Analyze the importance of coordination.
CO 5	Determine various factors responsible for increase in diversity of human resources.

UNIT I Introduction to Organization Behaviour

10 Hours

Meaning-Features- Nature and Scope of OB-The Basic Assumptions of OB- Major Disciplines and their Contributions to OB- Concepts of Strategic Organisational Behaviour and International Organisational Behaviour.

UNIT II Individual behaviour

10 Hours

Factors Affecting Individual Behaviour-Basic Psychological Process—Personality, Determinants Of Personality—Personality Traits—Perception, Perceptual Process- Factors Affecting Perception—Learning- Theories of Learning—Social Learning-Learning Curve- Organization Climate and Organizational Communication.

UNIT III Group Dynamics

11 Hours

Concept of Group Dynamics—Features of Group—Types of Group Behaviour—Formal and Informal Group Behaviour—Group Norms—Group Cohesiveness. Teamwork- Types School of Distance Education Organisational Behaviour 5 of Teams-Team Building-Team Roles- Team Norms- Team Cohesiveness.

UNIT IV Motivation and Leadership**10 Hours**

Motivation- Concept, Theories-Maslow 's, Hertzberg's and McGreger's, X and Y theories); Financial and Non-Financial Motivation. Leadership- Types—Theories (Trait theory, Michigan Studies and Fideler's Contingency Model); Modern Approach to Leadership Theories—Leadership Styles.

UNIT V Stress Management**11 Hours**

Meaning, Types of Stress— Causes of Stress Consequences of Work Stress- Conflict, Types of Conflicts—Levels of Conflict, Conflict Resolution-Organisational Development— Meaning, Need, Benefits and Limitations -Steps in OD - Organizational Changes – Case studies on successful and failures.

Text Books:

- Neharika Vohra Stephen, P. Robbins, Timothy, A. Judge, 2022, *Organizational Behaviour*, 18th Edition, Pearson Education, Delhi.
- Dr. Christopher, P. Neck, Jeffery, D. Houghton and Emma L. Murray, 2018, *Organizational Behaviour A Skill-Building Approach*, 2nd Editon, SAGE Publications Inc. London.

References Books:

- Uma Sekaran, (2018). *Organizational Behaviour*. Text & cases, Tata McGraw Hill Publishing CO. Ltd. (2ndEd) New Delhi.
- Gangadhar Rao, Narayana, V.S.P Rao, (1987). *Organizational Behaviour*, Konark Publishers Pvt. Ltd (1st Ed) Delhi.
- Jayasankar, J, (2017). *Organizational Behaviour*, Margham Publications, Chennai.
- Fred Luthans, (2019). *Organizational Behaviour*, McGraw Hill Education.

E-Resources:

- <https://www.iedunote.com/organizational-behavior>
- <https://www.london.edu/faculty-and-research/organisational-behaviour>
- <https://www.investopedia.com/terms/o/organizational-behavior.asp>

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Understand the concept of Organisation Design and determine the factors that affect Organisation Design.	K1
CO 2	Relate the components of Individual Behavior and apply the concept of Learning, Perception, Attitudes and values.	K2
CO 3	Develop to distinguish between a numbers of different leadership theories & styles and contribute to the effective performance of a team as the team leader or a group member.	K3
CO 4	Analyzing students will be able to justify how organizational change and conflict affect working relationships	K4
CO 5	Determine the complexities and solutions of human behavior.	K5

Course Mapping:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	3	1
CO2	3	3	2	3	3	1
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	2	3	3	1	2

High correlation: 70 % Medium correlation: 20% Low correlation: 10%

**MARKETING MANAGEMENT
UBAM306**

Semester : III
Category : Core VIII
Class &Major: II BBA.

Credit : 04
Hours / Week : 04
Total hours : 52

Course Objectives:

CO No.	To enable the students to
CO 1	Understand the role of marketing within society and within an economic system.
CO 2	Familiarize analytical skills in identification and resolution of problems pertaining to marketing management.
CO 3	Recall and appreciate the human behavior in organizations.
CO 4	Gain Knowledge about the product mix, channels of distribution and promotion of a product.
CO 5	Determine the buyer behavior and market segmentations.

UNIT I INTRODUCTION**10 Hours**

Introduction to Marketing and Marketing Management, Marketing Concepts - Marketing Process Marketing mix - Marketing environment. - Consumer Markets and buying behaviour - Market segmentation and targeting and positioning.

UNIT II PRODUCT DECISION**11 Hours**

Concept of a Product- Product Decisions – Levels of Product Hierarchy- New Product Development Process- Product Life Cycle - Product Packaging - Feature of Packaging and Marketing - Product mix- Four P's of Marketing - Dimensions of product Mix – Branding- Packaging and Labelling.

UNIT III PRICING**10 Hours**

Meaning of Pricing – Objectives of Pricing- Role of Pricing in Marketing Mix- Factors influencing pricing - Methods of Pricing- Types of Pricing – Pricing Decisions- Cost based and Demand based Strategies.

UNIT IV PROMOTION MANAGEMENT

11 Hours

Promotion- Significance- Promotion Mix Elements- Advertising Objectives- Types- Effectiveness- Budget-Media and its Selection- Personal Selling- Nature- Steps- Objectives- Tools-Public Relations- Direct Marketing and its Forms.

UNIT V CHANNEL MANAGEMENT AND RETAILING

10 Hours

Marketing Channels – Nature - Levels – Structure – Participants - Functions of Marketing- Intermediaries - Online Marketing- Retailing- Meaning- Significance- Marketing Research- Objectives - Need - Research Project.

Text Books:

- K.S Chandrasekar, 2015, *Marketing Management Text and Cases* Tata McGraw-Hill Publication, New Delhi.
- Mahajan,J.P.& Anupama Mahajan, 2014, *Marketing Management*, Vikas Publishing House, Chennai.

References Books:

- Philip Kotler, (2013). *Marketing Management*. Pearson Education (Singapore) Pvt Ltd.(11th Ed) New Delhi.
- Ramaswamy, V. S. Namakumari, (2009). *Marketing Management*. S.G. Wasani Macmillan India Ltd. Chennai.
- Saxena, Rajan, (2016). *Marketing Management*, Tata McGraw Hill Publication, New Delhi.

E-Resources:

- <https://open.umn.edu/opentextbooks/textbooks/50>
- <https://cpdonline.co.uk/knowledge-base/business/principles-of-marketing/>
- <https://libguides.riphah.edu.pk/c.php?g=405320&p=2759588>

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Recall the marketing objective of a company the student manager will be able to develop a suitable marketing mix.	K1
CO 2	Summarize the product student, managers will be able to apply the three steps of target marketing: market segmentation, target marketing, and market positioning.	K2
CO 3	Apply various stages in the life cycle of the product the student managers will be able to recommend a suitable pricing strategy.	K3

Directors– Independent Director and Whole time Key Managerial Personnel – Director Identification Number and its significance – duties, qualification and disqualification. Board meeting, shareholder meeting, committee meeting, mandatory committee meeting – Role and composition – Powers of the board – Notice , Agenda, minutes and resolution – Secretarial duties in meetings.

UNIT V - Winding Up

6 Hours

Modes of Winding up - Winding up by the tribunal – Voluntary Winding up – NCLT – Special courts – Mediation and Conciliation panel.

Text Books:

- Gaffoor & Thothadri, 2018, *Company Law and Secretarial Practice*, Vijay Nicole Prints, Chennai.
- Balachandran, V.& Govindarajan, M, 2020, *A Student Handbook on Company Law and Practice*, Vijay Nicole Prints, Chennai.

Reference books:

- Ravi, B. (2013). *Company Law and Secretarial Practice*. Pearson Education. (5th Ed). London.
- Vinod Kothar, (2013). *Company Law & Secretarial Practice*. Jain book agency. New Delhi.
- Srinivasan, (2021). *Company Law & Secretarial Practice*. Margham Publications.(5th Ed). Chennai.

e-Resources:

- <https://www.gacwrmd.in/learning/Commerce/Company%20law.pdf>
- <https://marghampublications.com/index.php/text-books/commerce-and-management/company-law-and-secretarial-practice-j-santhi>

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Recall the Characteristics and Classification of Companies.	K1
CO 2	Illustrate knowledge on the preparation of various documents of the company and Incorporation Procedures	K2
CO 3	Apply knowledge on issue of prospectus and shares to the public	K3
CO 4	Examine comprehensive knowledge on type of shares, share capital and transfer procedures	K4
CO 5	Determine the borrowing powers of the Company.	K5

Course Mapping:

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	3	3
CO2	3	3	3	3	3	3
CO3	3	2	3	3	3	3

State Financial Corporation SFC-Information - assistance from different organizations in setting up a new venture- technology parks-industrial corporations- directorate of industries - cottage and small scale industries-SISI, Khadi& Village Industries Corporation -Board.

UNIT-V CASE STUDIES

5 Hours

Case Studies-Diagnostic case studies of successful -unsuccessful entrepreneurs- key variables explaining success-failures- industrial sickness- industrial reconstruction- technology obsolescence- technology-transfer.

Text Books:

- Dr. Atul Kapdi, Dr. Pankaj Kumar Ambadas Anawade, Vinita Ahire Kale, 2015, *Startup and New Venture Management*, Thakur Publication Pvt. Ltd. Pune.
- Donald Kuratko. K & Jeffrey Hornsby. S, 2020, *New Venture Management: The Entrepreneur's Roadmap for Development, Management, and Growth*, 3rd Edition, Routledge.

Reference Books:

- Jyoti Gogte. (June 2014). *Startup and New Venture Management*. Vishwakarma Publications. (1st Ed). Pune.
- Pankaj Kumar & Ambadas Anawade. (2021). *Start Up And New Venture Management*. Kindle Edition.

E- Resources:

- <https://core.ac.uk/download/pdf/98660713.pdf>
- https://www.dimr.edu.in/wp-content/uploads/2022/08/209-Start-up-New-Venture-Management_PPT-.pdf
- <https://mssu.ac.in/courses-mba-innovation-and-new-venture-management>

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Select a start-up Enterprise with Big Idea Generation.	K1
CO 2	Classify start-up capital requirement by analyzing legal factors.	K2
CO 3	Experiment with feasibility Analysis towards funding issues.	K3
CO 4	Analyse growth stages in new venture and reasons for scaling ventures.	K4
CO 5	Evaluate financial stability and decide on expansion possibilities	K5

Course Mapping:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	2	1
CO2	3	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	3	2	2	3	1	2

CO5	3	3	3	3	2	3
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High correlation: 73.33% Medium correlation: 20% Low correlation: 6.66%

**HUMAN RESOURCE MANAGEMENT
UBAE407**

Semester : IV	Credit : 04
Category : Core IX	Hours / Week : 05
Class &Major: II BBA.	Total hours : 65

Course Objectives:

CO No.	To enable the students to
CO 1	Understand the functions, systems, policies and applications of Human Resource Management in organizations.
CO 2	Examine An overview of theoretical foundations of key areas associated with HR development in the organizations,
CO 3	Identify the HR skills and their ability to assess the constraints and opportunities associated with managing employees in different socio-economic and political context.
CO 4	Analyze the distinction between Recruitment and Selection.
CO 5	Determine about basics of compensation management and Performance appraisal.

UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT 13 Hours

Human Resource Management – Definition, Nature, objectives and functions of HRM - Role of Human Resource Manager- Evolution of HRM – HR polices- Computer applications in HRM - Human Resource accounting and audit.

UNIT II HUMAN RESOURCE PROCESS 14 Hours

Human resource planning - Job analysis and design- Recruitment – Selection and placement process- types of interview – Orientation and induction – determining training need analysis – Delivery methodology – Evolution – Capacity building .

UNIT III TRAINING AND DEVELOPMENT 14 Hours

Types of training methods –purpose- benefits- resistance. Executive development programme – Common practices - Benefits – Self-development – Knowledge management.

UNIT IV EMPLOYEE ENGAGEMENT 12Hours

Compensation plan – Reward – Motivation – Application of theories of motivation – Career management – Mentoring - Development of mentor – Protégé relationships- Job Satisfaction, Employee Engagement, Organizational Citizenship Behaviour: Theories, Models.

UNIT V PERFORMANCE EVALUATION AND CONTROL 12 Hours

Method of performance evaluation – Feedback – Industry practices. Promotion – Demotion, Transfer and Separation – Implication of job change. The control process – Importance – Methods – Requirement of effective control systems grievances – Causes – Implications – Redressal methods.

Text Books:

- Subba Rao, 2018, *Human Resource Management*, Konarak Publisher.
- C.B. Gupta, 2017, *HRMS*, Chand Publisher, New Delhi.

References Books:

- Ashwathappa, (2019). K. *Human Resource Management*. McGraw Hill Education India. (6th Ed).

E-Resources:

- <https://mrcet.com/downloads/MBA/digitalnotes/Human%20Resource%20Management.pdf>
- <http://kamarajcollege.ac.in/Department/BBA/III%20Year/e003%20Core%2019%20-%20Human%20Resource%20Management%20-%20VI%20Sem.pdf>
- <https://backup.pondiuni.edu.in/sites/default/files/HR%20Management-230113.pdf>

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Define Integrated perspective on role of HRM in modern business.	K1
CO 2	Explain Competency to recruit, train, and appraise the performance of employees.	K2
CO 3	Identify Rational design of compensation and salary administration.	K3
CO 4	Functions to handle employee issues and evaluate the new trends in HRM.	K4
CO 5	Determine the Collaborate with others, in the development, implementation, and evaluation of organizational health and safety policies and practices.	K5

Course Mapping:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	1
CO 2	3	3	3	3	3	2
CO 3	2	1	3	3	2	3
CO 4	3	1	3	3	2	2
CO 5	3	1	3	3	2	2

High correlation: 57% Medium correlation: 30% Low correlation: 13.3%

**MANAGEMENT INFORMATION SYSTEM
UBAM408**

Semester : IV
Category : Core XII
Class &Major: II BBA.

Credit : 04
Hours / Week : 05
Total hours : 65

Course Objectives:

CO No.	To enable the students to
CO 1	Understand MIS in decision making
CO 2	Examine the MIS, its structure and role in management functions
CO 3	Classify & discuss information system categories, Database Management systems
CO 4	Analyze SDLC(System Development Life Cycle) and functional information system categories
CO 5	Outline functions of BPO, Data mining and the recent trends in information management

UNIT I Management information system in a digital firm **13 Hours**

Meaning and use of MIS – System view of business – Process of MIS – Development of MIS within the organization - Management Process – Information needs – system approach in planning - organizing and controlling MIS.

UNIT II System analysis and design: **14 Hours**

System Development Model - Structured System Analysis and Design - Object Oriented Analysis – planning implementation and controlling of management information system.

UNIT III Information system applications: **14 Hours**

MIS applications, DSS – GDSS - DSS applications in E enterprise - Knowledge Management System and Knowledge Based Expert System - Enterprise Model System and E-Business, E-Commerce, E-communication, Business Process Reengineering.

UNIT IV Technology of information system: **12 Hours**

Data base management system: Objectives of data base approach- Characters of database Management systems- Data processing system- Components of DBMS packages - Data base administration- Data models - Data warehouse - Data process- Transaction and application process Information system process - Unified communication and network.

UNIT V Enterprise Management **12 Hours**

Meaning- process- importance- Technologies Business Process Reengineering- Total Quality Management and Enterprise Management System viz. ERP- SCM-CRM and Ecommerce- Security challenges in E-enterprises – file organisation and database - Data management – File design – Programme design – Control and security.

Text Books:

- John Walkenback, 2010, *Management Information System*, 5th Edition, Wiley Publications.
- Michael Alexander, *Management Information Systems and EDP*, 2014, 2nd Edition, Himalaya Publishing House.

Reference Books:

- Sadagopan, (2019). *Management Information System* . Prentice- Hall of India (3rd Ed).

- Murthy, C S V. (2021). *Management Information Systems*. Himalaya Publishing House. (2nd Ed).
- Dr. Rajagopalan,S.P. (2022). *Management Information Systems and EDP*. Margham Publications. (1st Ed). Chennai.

e-Resources:

- https://www.tutorialspoint.com/management_information_system/management_information_system.htm
- http://tumkuruniversity.ac.in/oc_ug/comm/notes/MIS.pdf
- JMIS - Journal of Management Information Systems (jmis-web.org)
- Management Information Systems Quarterly | AIS Affiliated Journals | Association for Information Systems (aisnet.org)

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Relate the basic concepts and technologies used in the field of management information systems.	K1
CO 2	Develop and implementing information systems.	K2
CO 3	Apply the role of the ethical, social, and security issues of information systems.	K3
CO 4	Analyzing the role of information systems in organizations, the strategic management processes, with the implication for the management.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	3	2	2
CO2	3	3	2	3	3	2
CO3	3	3	3	2	3	2
CO4	2	3	3	2	3	3
CO5	3	3	2	3	2	2

High correlation: 60% Medium correlation: 40% Low correlation: NIL

TALENT MANAGEMENT UBAD401

Semester	: IV	Credit	: 02
Category	: Discipline specific	Hours / Week	: 02
Class &Major	: II BBA.	Total hours	: 26

Course Objectives

CO No.	To enable the students to
C1	Define Talent Management and its significance
C2	Understanding performance excellence through Talent Management
C3	Apply Talent Management concepts in Human Resource Management

C4	Analyzing Talent Management practices in employee development and career enhancement
C5	Formulate the Talent Management Strategies for any organization.

Unit 1 Talent Management

5 Hours

Definition-Meaning of Talent Management- Objectives & Role of Talent Management in building sustainable competitive advantage to a firm- Key Processes of Talent Management- Consequences of Failure in Managing Talent- Benefits of Talent Management- How Your Business Can Benefit From it- Responsibilities of Talent Management Manager & Professionals.

Unit 2 Talent Management Planning

6 Hours

Understanding the Needs and Mind set of Employee- Steps in Talent Management Process- Knowledge – Values- Beliefs and Skill Implications for Talent Management- Modelling Excellence.

Unit 3 Talent Acquisition

5 Hours

Defining Talent Acquisition- Develop high potential employee - High performance workforce- Importance of Talent Development Process- Steps in Developing Talent- Succession Planning- Difference between Talent Acquisition and Recruitment - Current Trends in Talent Acquisition.

Unit 4 Talent Retention

5 Hours

"SMR Model" (Satisfy, Motivate and Reward) – The Formula to Win Your Employees & Retain Them - Employee Retention Programs - Career Planning & Development - Return on Investment (ROI) on Talent Management - Employee Engagement - Best Practices in Employee Retention.

Unit 5 Opportunities and Challenges in Talent Management

5 Hours

Talent Management Challenges - Strategies to Overcome the Challenges - Opportunities in Talent Management - Talent Management in the Digital Era - Current trends in Talent Management.

Text Books:

- Varkkey Biju, Dessler Gary, 2021, *Fundamentals of Human Resource Management*, 14th Edition, Pearson.
- Lance A Berger, Dorothy R Berger, 2007, *Talent Management Hand Book*, 3rd Edition, McGraw-Hill.

Reference Books:

- Shukla Ravinder, (2009) *Talent Management: Process of Developing & Integrating Skilled Workers*, Global India Publications.
- Sally Bibb, (2012). *Strengths Based Recruitment and Development: A Practical Guide to Transforming Talent Management Strategy for Business Results*.
- R.N. Misra, (2019). *Talent Management*, Publishing House Pvt. Ltd.

e-Resource

- <https://bookboon.com/en/talent-management-a-focus-on-excellence-ebook>
- https://silversoft.co.za/wp-content/uploads/2016/05/Talent_Management_for_Dummies.pdf
- <http://www.oracle.com/us/media1/talent-retention-6-best-practices-1676595.pdf>

Course Outcomes:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Defines the talent management strategic plan for the organization chosen	K1
CO 2	Illustrates the connections between factors identified, the strategy of the company and the talent management system	K2
CO 3	Develops talent management strategy for the organization chosen	K3
CO 4	Examine the discrepancies in positioning and perception of the talent management components in the organization	K4
CO 5	Describes main historical aspects of talent management	K5

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	2
CO3	3	3	2	3	2	3
CO4	3	1	2	2	1	3
CO5	3	2	1	3	2	2

High correlation: 46.7% Medium correlation: 43.3% Low correlation: 10%

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core Course-V	UBAM305	Organizational Behaviour	Assignment	Group Discussion
	Core Course-VI	UBAM306	Marketing management	Assignment	Product Development
	Skill enhancement course (Discipline specific)	UBAD301	Company law and Secretarial Practices	Assignment	Seminar
	Skill enhancement course (entrepreneurial)	UBAU301	Startup and venture Management	Assignment	Poster presentation
IV	Core Course-VII	UBAE407	Human Resource Management	Assignment	Case study
	Core Course-VIII	UBAM408	Management information system	Assignment	Seminar
	Skill enhancement course (Discipline specific)	UBAD401	Talent Management	Assignment	Case study

DEPARTMENT OF COMMERCE

PREAMBLE

UG: Programme profile and the syllabi of courses offered in semester III and IV along with III and IV evaluation Components (with effect from 2023-2026 batch onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would have
PSO-1	Understand and acquire knowledge on various concepts in the discipline of Commerce
PSO-2	Develop business skills, positive attitude to meet the expectation in the industry at the national and global level.
PSO-3	Apply the statutory regulations that govern business.
PSO-4	Discover the business opportunities to create and manage social innovations for sustainable entrepreneurship.
PSO-5	Adapt to rapidly changing environment with learned knowledge and skills and become socially responsible citizen.
PSO-6	Build a professional career and/or further higher education in the specified areas of specialization.

PROGRAMME PROFILE B.Com.

Semester	Part	Category	Course code	Course Title	ContactHrs /Week	Credits Min/Max
I	I	Language	UTAL110 UHIL102 UFRL102	General Tamil/Hindi/French I	5	3
	II	English	UENL111	General English I	5	3
	III	Core Course-I	UCOM105 UCCM103	Basics of Financial Accounting	5	4
	III	Core Course-II	UCOM106 UCCM106	Principles of Management	5	4
		Discipline Specific Elective	UCOO107	Business Economics	4	3
	IV	Foundation Course	UCOF101 UCCF101	Fundamentals of Commerce	2	2
		Skill Enhancement Course-SEC1(Non-Major Elective)	UCOE101	NME	2	2
AECC1 Soft skill		USKS103	Communicative English	2	2	
TOTAL					30	23
	I	Language	UTAL210 UHIL202 UFRL202	General Tamil II/Hindi II/French II	5	3
	II	English	UENL211	General English II	5	3

II	III	Core Course-III	UCOM207 UCCM207	Advanced Financial Accounting	5	4
		Core Course-IV	UCOM208 UCCM208	Business Law	5	4
	III	Discipline Specific Elective	UCOO209	Office Management & Secretarial Practice	4	3
	III	Internship	UINS201		-	-/2
	IV	Skill Enhancement Course (NME)	UCOE202	NME	2	2
		Discipline Specific/SEC II	UCOD201 UCCD201	Computerized Accounting	2	2
		AECCII – Soft Skill	USKS201	Interview Skills	2	2
	V	Extension Activity			-	1/2
	VI	Value Added Course\Outside classes			-	-/2
	TOTAL					30	24/29
III	I	Language	UTAL310 UHIL302 UFRL302	General Tamil III/ Hindi III/ French III	5	3
	II	English	UENL311	General English III	5	3
	III	Core Course V	UCOM309 UCCM309	Corporate Accounting I	4	4
		Core Course-VI	UCOM310 UCCM310	Company Law	4	4
		Discipline Specific Elective	UCOO311	EXIM Procedures and Documentation	4	3
	IV	Skill enhancement course (Entrepreneur)	UCOD302 UCCD302	Entrepreneurship	2	1
		Skill Enhancement Course – Discipline specific	UCOU303	Basics of Business Correspondence	2	2
	IV	Value Education	UGEV301	Value Education	2	2
		AECC III	USKS303	Soft skill	2	2
	TOTAL					30	24
IV	I	Language	UTAL410 UHIL402 UFRL402	General Tamil IV/ Hindi IV/ French IV	5	3
	II	English	UENL411	General English IV	5	3
	III	Core Course-VII	UCOM413 UCCM413	Corporate Accounting II	5	4
		Allied	UMAA412	Business Mathematics & Statistics	5	4
		Discipline Specific Elective	UCOO414	E–Commerce	4	3

		Discipline Specific SEC	UCOD405 UCCD405	Service Marketing	2	2
	III	Internship / Industrial Training	UINS401	Internship / Industrial Training		-/2
	IV	Skill Enhancement course IV	UCOU406	Micro Small Medium Enterprises	2	2
		AECCIV Soft Skill			2	2
	V	Extension Activity/Physical Education/NCC			-	-/2
	VI	Value Added Course/ outside classes			-	-/2
TOTAL					30	23/29
V	III	Core Course-IX	UCOM513 UCCM513	Cost Accounting-I	5	4
		Core Course-X	UCOM514 UCCM514	Banking Law and Practice	5	4
		Core CourseXI	UCOM515 UCCM515	Income Tax Law and Practice I	5	4
		Core Course-XII	UCOM516 UCCM516	Auditing and Corporate Governance	5	4
	III	Core Project Discipline Specific	UCOP501		4	3
	III	Discipline Specific VII	UCOM518	Financial Services	4	3
	IV	Environmental Studies	UGEV501	Environmental Studies	2	2
TOTAL					30	24
VI	III	Core Course-XIII	UCOM618 UCCM618	Cost Accounting-II	5	4
		Core Course-XIV	UCOM619 UCCM619	Management Accounting	5	4
		Core Course-XV	UCOM620 UCCM620	Income Tax Law &Practice II	5	4
		Elective Discipline Specific	UCOO621	Financial Management	6	4
		Elective Discipline Specific	UCOO622	Basics Of MS Excel	5	3
		Internship/Industrial Training	UINS601	Internship/Industrial Training		-/2
		Comprehensive Viva	UCOM607/ UCCM607/ UIAM606			1
	IV	Professional competency Skill Enhancement Course SEC	UCOC601	Professional Competency	4	2
	V	Extension Activity/Physical Education/NCC				-/2
	VI	Value Added Course				-
TOTAL					30	22/26
GRANDTOTAL					180	140/155

NON –MAJOR ELECTIVE

The Courses are offered to all major except B.Com, B.Com CA, BBA and BCA

Semester	Category	Course Code	Course Title	Contact /Week	Credit
					Min /Max
I	Non Major Elective–I / (SEC)	UCOE101	Basics of Accounting	2	2
II	Non Major Elective–I / (SEC)	UCOE202	Accounting for Non Trading Concern	2	2

SELF STUDY

Semester	Course code	Course Title	Contact /hours	Credit	
				Min	Max
I	UCOS101/ UCCS101	Business organization/ Corporate Governance	-		1

DEPARTMENT OF COMMERCE

PREAMBLE

UG: Programme profile and the syllabi of courses offered in semester III and IV along with III and IV evaluation Components (with effect from 2023-2026 batch onwards).

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would have
PSO-1	Understand the operative systems and having working knowledge of software commonly used in academic and professional environments.
PSO-2	Develop business skills, positive attitude to meet the expectation in the industry at the national and global level.
PSO-3	Apply the statutory regulations that govern e-business
PSO-4	Discover e- business opportunities to create and manage social innovations for sustainable e-entrepreneurship and become socially responsible citizen. .
PSO-5	Adapt to recent office automation with computers and computer software applications
PSO-6	Build a professional career and/or further higher education in the specified areas of specialization.

PROGRAMME PROFILE B.Com. (CA)

	Part	Category	Course code	Course Title	Contact Hours/Week	Credits Min/Max
I	I	Language	UTAL110/ UHIL102/ UFRL102	General Tamil I/ Hindi I/ French I	5	3
	II	English	UENL111	General English I	5	3
	III	Core Course-I	UCCM103/ UCOM105	Basics of Financial Accounting	5	4
		Core Course-II	UCCM106/ UCOM106	Principles of Management	5	4
		Generic(EC1)	UCSA106	Computer Fundamentals	4	3
	IV	Foundation Course	UCCF101/ UCOF101	Fundamentals of Commerce	2	2
		Skill Enhancement Course SEC -1 (Non Major Elective)	UCOE101	NME	2	2
		AECC1 –Soft skill	USKS103	Communicative English	2	2
TOTAL					30	23
II	I	Language	UTAL210 UHIL202 UFRL202	General Tamil II/Hindi II/French II	5	3
	II	English	UENL211	General English II	5	3
	III	Core Course III	UCCM207 UCOM207	Advanced Financial Accounting	5	4
		Core Course-IV	UCCM208 /UCOM208	Business Law	5	4
		Generic(EC2)	UCSA206	Programming with C++	4	3

	III	Internship	UINS201			-/2
	IV	SECII	UCOE202	NME	2	2
		Discipline Specific (SEC3)	UCCD201	Computerized Accounting	2	2
		AECCII Soft skill	USKS201		2	2
	V	Extension Activity/Physical Education/ NCC				1/2
	VI	Value Added Course				-/2
TOTAL					30	24/29
III	I	Language	UTAL310/ UHIL302/ UFRL302	General Tamil III/ Hindi III/French III	5	3
	II	English	UENL311	General English III	5	3
	III	Core Course-V	UCCM309 UCOM309	Corporate Accounting I	4	4
		Core Course-VI	UCCM310 UCOM310	Company Law	4	4
		Generic(EC3)	UCSA308	Business Intelligence and Data Analytics	2	2
	UCSR316		Business Intelligence and Data Analytics Lab	2	1	
	IV	Discipline Specific(SEC 4)	UCCD301	Entrepreneurship	2	1
		Skill Enhancement course 5 (Discipline Specific)	UCCU303	Basics of Business Correspondence	2	2
	IV	AECC3- Soft skill	USKS303	Soft Skill	2	2
	IV	Value Education	UGEV301	Value Education	2	2
TOTAL					30	24
IV	I	Language	UTAL410/ UHIL402/ UFRL402	General Tamil IV/ Hindi IV/ French IV	5	3
	II	English	UENL411	General English IV	5	3
	III	Core Course-VII	UCCM413 UCOM413	Corporate Accounting II	5	4
		Allied	UMAA412	Business Mathematics & Statistics	5	4
	III	Generic(EC4)	UCSA409	Digital Marketing	4	3
		Internship	UINS401			-/2
	IV	Discipline Specific (SEC6)	UCOD405/ UCCD405	Service Marketing	2	2
		Skill Enhancement course – 7	UCCU406	Micro Small Medium Enterprises	2	2
		AECC4 - Soft Skill		Soft Skill	2	2
	V	Extension Activity/Physical Education/ NCC				-/2
VI	Value Added Course				-/2	
TOTAL					30	23/29

V	III	Core Course-IX	UCCM513 UCOM513	Cost Accounting-I	5	4
		Core Course-X	UCCM514/ UCOM514	Banking Law and Practice	5	4
		Core Course-XI	UCCM515 UCOM515	Income Tax Law and Practice I	5	4
		Core Course-XII	UCCM516 UCOM516	Auditing and Corporate Governance	5	4
		Generic(EC5)	UCSA511	Mobile Computing	4	3
		Core Project	UCCP501		4	3
	IV	Value Education	UGEV501	Environmental studies	2	2
TOTAL					30	24
VI	III	Core Course-XIII	UCCM618 UCOM618	Cost Accounting-II	5	4
		Core Course-XIV	UCCM619 UCOM619	Management Accounting	5	4
		Core Course-XV	UCCM620 UCOM620	Income Tax Law & Practice II	5	4
		Generic(EC6)	UCSA601	Web Designing	5	3
		Elective Discipline Specific	UCCO621	Financial Management	6	4
		Internship				-/2
		Comprehensive Viva	UCOM607/ UCCM607/ UIAM606		-	1
	IV	Professional competency Skill Enhancement Course	UCCC601	Professional Competency	4	2
	V	Extension Activity/Physical Education/NCC				-/2
	VI	Value Added Course				-
TOTAL					30	22/26
GRANDTOTAL					180	140/155

CORPORATE ACCOUNTING I

UCOM309/UCCM309

Semester : III
Category : Core V
Class & Major : II B.Com & B.Com CA

Credit : 4
Hours/Week: 4
Total : 52

Course Objectives

CO No.	To enable the students
CO 1	Understand the fundamental accounting concepts, such as issue of shares, par value, discount value, premium, redemption etc.
CO 2	Examine the provisions of issue and redemption of preferences shares and debentures
CO 3	Identify various assets and liabilities, including property, plant, and equipment, intangible assets, current liabilities, and long-term debt
CO 4	Analyze financial statements, balance sheet, and valuation.
CO 5	Determine the accounting methods, valuation of financial position of the concern.

UNIT – ISSUE OF SHARES

12 Hours

Issue of Shares - Forfeiture – Reissue- Pro-rata Allotment-Rights Issue – Bonus Issue – Underwriting of Shares and Debentures – Underwriting Commission - Types of Underwriting.

UNIT – II REDEMPTION OF PREFERENCE SHARES & DEBENTURES 10 Hours

Redemption of Preference Shares – Par - Discount- Redemption at Premium. Debentures Issue and Redemption – Meaning – Methods.

UNIT III FINAL ACCOUNTS

10 Hours

Introduction – Final Accounts – Form and Contents of Financial Statements as Per Schedule III of Companies Act 2013 – Part I Form of Balance Sheet – Part II Form of Statement of Profit and Loss – Ascertaining Profit for Managerial Remuneration.-Profit Prior to Incorporation.

UNIT IV VALUATION OF GOODWILL & SHARES

10 Hours

Valuation of Goodwill and Shares - Factors Affecting Goodwill - Methods of Valuation - Acquisition of Business.

UNIT V INDIAN ACCOUNTING STANDARDS

10 Hours

International Financial Reporting Standard (IFRS)–Meaning and its Applicability in India - Indian Accounting Standards – Meaning – Objectives – Significance – Accounting Standards in India – Procedures for Formulation of Standards – Ind AS – 1 Presentation of Financial Statement.

THEORY 20% & PROBLEMS 80%

Course Outcome

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO 1	Recall the basic concepts and relate it to corporate accounting.	K1,K2
CO 2	Apply the accounting treatment in issue of shares at par premium and discount, issues of debenture, managerial remuneration, calculation of goodwill and shares and liquidator's statement of affairs.	K3
CO 3	Analyzing financial statements, including income statements, and balance sheets.	K4
CO 4	Evaluate the techniques of preparing balance sheet of various concerns.	K5
CO 5	Develop and prepare company accounts, bank accounts, and holding company accounts independently.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	2	3	3
CO4	3	2	2	3	3	3
CO5	3	3	3	3	3	3

High Correlation- 60 %Medium Correlation- 40 %Low Correlation - Nil

Text Books

- S.P. Jain and N.L. Narang,(2019)*Advanced Accounting Vol I*, Kalyani Publication, New Delhi.
- R.L. Gupta and M. Radhaswamy,(2020)*Advanced Accounts Vol I*, Sultan Chand, New Delhi.
- Broman,(2019)*Corporate Accounting*, Taxmann, New Delhi.

Reference Books

- T.S. Reddy, A. Murthy,(2020) *Corporate Accounting-* Margham Publication, Chennai.
- D.S.Rawat&NozerShroff,(2020) *Students Guide To Accounting Standards* ,Taxmann, New Delhi.

E Resources

- <https://www.tickertape.in/blog/issue-of-shares/>
- <https://www.taxmann.com/bookstore/bookshop/bookfiles/chapter12valuationofgoodwillandshares.pdf>

COMPANY LAW
UCOM310/UCCM310

Semester : III
Category : Core VI
Class & Major : II B.Com & B.Com CA

Credit : 4
Hours/ Week : 4
Total : 52

Course Objective

CO No.	To enable the students
CO1	Understand the concept of company and formation of company.
CO2	Identify the legal principles behind contractual agreement.
CO3	Examine the requisites of meeting and resolution.
CO4	Assess the procedure to appoint and remove Auditors and Directors,
CO5	Adapt to the changing legal process of a company.

UNIT I INTRODUCTION TO COMPANY LAW **10 Hours**

Companies Act 2013 – Definition of a Company, Characteristics of Company — Company Distinguished from Partnership and Limited Liabilities Partnerships – Classification of Companies – Based on Incorporation.

UNIT II FORMATION OF COMPANY **12 Hours**

Formation of a Company – Promoter – Fundamental Documents – Memorandum of Association – Contents – Alteration – Articles of Association - Prospectus – Contents - Kinds – Liabilities – Share Capital – Kinds – Issue – Alteration – Dividend – Debentures.

UNIT III – MEETING **10 Hours**

Meeting and Resolution – Types – Requisites – Voting & Poll – Resolution – Ordinary, Special - Audit & Auditors – Qualification, Disqualification, Appointment and Removal of an Auditor.

UNIT IV – MANAGEMENT & ADMINISTRATION **10 Hours**

Management & Administration – Directors – Legal Position – Board of Directors – Appointment/ Removal – Disqualification – Director Identification Number – Directorships – Powers – Duties – Board Committees .

UNIT V WINDING UP **10 Hours**

Meaning – Modes – Compulsory Winding Up – Voluntary Winding Up – Consequences of Winding Up Order – Powers of Tribunal – Petition for Winding Up – Company Liquidator.

Course Outcome

CO No.	Upon completion of these course, the student will be able to	Bloom's Level
CO 1	Recall & compare the basics of laws governing formation of different types of companies.	K1,K2
CO 2	Identify the fundamental legal principles behind contractual agreements.	K3
CO 3	Examine how businesses can be held liable in torts.	K4
CO 4	Assess problem solving techniques and present coherent, concise legal argument.	K5
CO 5	Adapt to changing legal process in developing a company or enter into legal filed.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	3	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation- 63.33 % Medium Correlation-36.67 %Low Correlation Nil

Textbooks

- N.D. Kapoor,(2019) Company Law, Sultan Chand and Sons, Chennai
- R.S.N. Pillai (2021), Business Law, S.Chand, New Delhi.

Reference Books

- Gaffoor&Thothadri,(2019) Company Law, Vijay Nichole Imprints Limited, Chennai
- M.R. Sreenivasan,(2020)Business Laws, Margham Publications, Chennai

E-Resources

- <https://www.mca.gov.in/content/mca/global/en/acts-rules/companies-act/companies-act-2013.html>
- <https://vakilsearch.com/blog/explain-procedure-formation-company/>

EXIM PROCEDURES AND DOCUMENTATION UCOO311

Semester : III

Credit : 3

Category: Discipline Specific Elective

Hours/Week :4

Class & Major: II B.Com

Total Hours : 52

Course Objective

CO No.	To enable the students
CO1	Recall and Understand the various concept of export, import .
CO2	Identify the export documentation procedure.
CO3	Examine the import documentation procedure.
CO4	Assess the various incentives available for export.
CO5	Acquaint with the various institutional support systems

UNIT I EXPORT-IMPORT PROCEDURE

10 Hours

Procurement for Export–Planning and Methods of Procurement for Exports - Instruments and Related Procedures and Documentation; Custom Clearance of Import–Regulations, Procedure and Documentation.

UNITII EXPORT DOCUMENTATION

10 Hours

Types of Documents – Characteristics and Relevance. An Introduction to Online Documentation. Getting Ready for Export Contract and Incoterms. Procuring and Processing of an Export Order.–Documentary Credit and Collection Financing for Export Pre- and Post-Shipment Credit.

UNIT III IMPORT DOCUMENTATION

10 Hours

Duty Exemption Schemes -Objectives, Benefits, Procedures and Documentation –Schemes for Import of Capital Goods–Procedures and Documentation for New/ Second-Hand Capital Goods.

UNIT IV EXPORT INCENTIVE AND CARGO HANDLING: FOREIGN EXCHANGE RISKS 12 Hours

Nature of Risks, Cargo Insurance - Contract of Cargo Insurance, Procedures and Documentation for Cargo Loss Claims–Role and Schemes of ECGC of India and Commercial Banks, Quality Control and Pre-Shipment Inspection: Schemes Excise and Custom Clearance Regulations, Procedures and Documentation –Export Incentives.

UNIT V INSTITUTIONAL SUPPORT

10 Hours

Export/Trading/Star Trading/Superstar Houses - Objective Criteria and Benefits - Procedures and Documentation –Special Economic Zones: Objectives and Benefits – Introduction to Export Promotion Council (EPC) –Indian Trade Promotion Organization (ITPO).

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Define the concepts of export and import and relate it to export and import procedures.	K1, K2
CO2	Apply the export and import regulations.	K3
CO3	Analyze the various export and import methods.	K4
CO4	Choose the competitive funding institutions.	K5
CO5	Develop the organizations and institutions that help foreign trade process.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 3	PSO 4	PSO 5
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	2	3	3
CO4	3	2	2	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 60 %Medium Correlation :40 % Low Correlation : Nil

Textbooks

- Dr.Swapna Pillai(2021),*EXIM Procedures And Documentation*, Shashi Bhawan Publishing House, Chennai
- C. Rama Gopal (2019), *EXIM Procedures, Documentation And Logistics*, New Age International Publishers, New Delhi.

Reference Books

- Thomas E. Johnson,(2020), *EXIM Procedures And Documentation*, AMACOM, United States
- P. Veera Reddy & P. Mamatha, (2019), *Export Documentation*, Commercial Law Publishers, New Delhi.

Web Resources

- <https://www.economicdiscussion.net/international-economics/export-documentation-and-its-types-with-specimens/4273>
- <https://www.freightpros.com/blog/cargo-insurance/>

ENTREPRENEURSHIP UCOD302/UCCD302

Semester : III
Category : Skill Enhancement Course
Class & Major : B.Com & B.Com CA

Credit : 1
Hours / Week : 2
Total Hours: 26

Course Objectives

CO No.	To enable the students
CO1	Acquire the meaning and characteristics of entrepreneurship
CO2	Develop the various business opportunities
CO3	Apply the process of setting up an enterprise
CO4	Assess the different aspects of legal compliance of setting up & running of an enterprise
CO5	Develop new business and enterprises for overall economic growth

UNIT I INTRODUCTION TO ENTREPRENEURSHIP

6 Hours

Meaning of Entrepreneurship – Characteristics of Entrepreneurship – Types of Entrepreneurship – Self Employment – Difference between Entrepreneurship and Employment.

UNIT II DESIGN THINKING

5 Hours

Idea Generation – Identification of Business Opportunities – Design Thinking Process – Creativity – Invention – Innovation.

UNIT III SETTING UP AN ENTERPRISE

4 Hours

Process of Setting up an Enterprise – Forms of an Enterprise – Sole Proprietorship – Partnership – Joint Stock Company.

UNIT IV BUSINESS MODEL CANVAS AND FORMULATION OF PROJECT REPORT

5 Hours

Introduction – Contents of Project Report – Project Description – Market Survey – Fund Requirement – Legal Compliance of Setting Up of an Enterprise.

UNIT V MSME'S AND SUPPORT INSTITUTIONS

6 Hours

Government Schemes and Women Entrepreneurship – Importance of MSME for Economic Growth – MSME – Definition – Role of Government Organizations in Entrepreneurship Development – MSME DI – DIC – Khadi and Village Industries.

COURSE OUTCOME

CO No	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understand and compare the role entrepreneurship in different facets of society.	K1,K2
CO2	Select the competitive livelihood support for employment opportunities	K3
CO3	Analysis the various Institution and schemes supporting entrepreneurs	K4
CO4	Determine insights into market trends, customer behavior, and competitive analysis to make informed decisions.	K5
CO5	Develop a network of contacts and foster relationships with mentors, investors, customers, and partners is vital for entrepreneurial success.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 3	PSO 4	PSO 5
CO1	3	3	2	2	2	2
CO2	3	2	3	1	1	1
CO3	3	3	2	1	1	1
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation:60%Medium Correlation: 20%Low Correlation : 20 %

Textbooks

- Jayashree Suresh, (Reprint 2017) *Entrepreneurial Development*, Margham Publications. Chennai.
- Dr. C.B. Gupta &Dr. S.S. Khanka (Reprint 2014).*Entrepreneurship And Small Business Management*, Sultan Chand & Sons, New Delhi.

Reference Books

- CharantimathPoornima, (Reprint 2014.), *Entrepreneurship development-Small*, Pearson Education, India.
- RajShankar(2016),*EntrepreneurshipTheoryandPractice*,VijayNicoleandImprints Pvt. Ltd, Chennai.
- Vasant Desai(2017), *Dynamics of Entrepreneurial Development & Management* Twenty Fourth Edition. Himalaya Publishing House. Mumbai.

E- Resources

- <https://www.interaction-design.org/literature/topics/design-thinking>
- <https://www.bms.co.in/steps-involved-in-setting-up-of-an-enterprise/>
- <http://www.msme.gov.in/>

BASICS OF BUSINESS CORRESPONDENCE
UCOU303/UCCU303

Semester : III
Category : Discipline Specific
Class& Major : II B.Com/ B.Com CA

Credit :2
Hours/Week :2
Total Hours : 26

COURSE OBJECTIVES:

CONo.	To enable the students
CO-1	Understand the principles and importance of communication in commerce and trade.
CO-2	Classify the different kinds of business letters.
CO-3	Examine the different procedures in business correspondence
CO-4	Analyze the different modes of modern forms of correspondence.
CO-5	Develop the modern forms of communication.

UNIT-I-INTRODUCTION TO BUSINESS CORRESPONDENCE 6 Hours

Definition –Business Correspondence – Significance-Types – Principles of Effective Correspondence – Barriers - Business Letter – Layout.

UNIT-II BUSINESS LETTERS 5 Hours

Kind of Business Letters–Interviews – Appointment –Acknowledgement – Promotion– Enquiries - Replies – Orders – Sales – Circular Letters – Complaints.

UNIT-III BANKING CORRESPONDENCE 5 Hours

Bank Correspondence -Company Correspondence – Correspondence with Shareholders & Directors.

UNIT-IV OFFICE CORRESPONDANCE 5 Hours

Reports-Types of reports-Report writing – Agenda - Minutes of meeting - Preparation of Memorandum – office order - Circulars - Notes.

UNIT-VMODERN FORMS OF COMMUNICATION 5 Hours

Modern forms of Communication – Fax – e-mail – Video conferencing – Internet –Websites and their use in Business.

Text Books

- Rajendra Pal and Korlahalli. J. S.(2010)*Essentials Of Business Communication*,Sultan Chand.&Sons New Delhi.
- Ramesh & PattenShetty(2009) “*Effective Business Communication*”, S.Chand&Co, New Delhi.

Reference Books

- Bovee,Thill,Schatzman,(2008) *Business Communication Today*, Pearson Education Private Ltd, New Delhi.
- Mary Ellen Guffey,(2004) *Business Communication, Process and Product-International*, Thomson Publishing New Delhi.
- Pennrose, Rasbery, Myers,(2004)*AdvancedBusinessCommunication* New Delhi

Course Outcome

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO 1	Recall and understand the basic principles of professional writing.	K1, K2
CO 2	Identify the different components of business correspondence.	K3
CO 3	Analyze the effectiveness of business correspondence in building professional relationships and achieving organizational goals.	K4
CO 4	Assess the impact of cultural differences on cross-cultural business communication.	K5
CO 5	Develop customized templates and guidelines for standardizing business correspondence within an organization.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 3	PSO 4	PSO 5
CO1	3	3	3	2	2	2
CO2	3	3	3	2	1	1
CO3	3	3	3	2	1	1
CO4	3	2	2	2	1	1
CO5	3	3	3	3	3	3

High Correlation : 53.33 % Medium Correlation :26.67 %Low Correlation:20 %

CORPORATE ACCOUNTING – II

UCOM413/UCCM413

Semester : IV

Category : Core VII

Class & Major : B.Com & B.Com CA

Course Objectives

Credit :4

Hours/Week :5

Total Hours : 65

CO No.	To enable the students
CO1	Understand the concepts and types of amalgamation
CO2	Examine the procedure for reconstruction
CO3	Identify the procedure for preparing final statements of banking companies
CO4	Appraise the legal requirements of financial accounts
CO5	Develop an insight on different modes of winding up of a company

UNIT I AMALGAMATION, ABSORPTION & EXTERNAL RECONSTRUCTION 15 Hours

Amalgamation, Absorption and External Reconstruction - Purchase Consideration - Lump sum Method, Net Assets Method, Net Payment Method, Intrinsic Value Method - Types of Amalgamation (Excluding Inter-Company Holdings).

UNIT II ALTERATION OF SHARE CAPITAL – & INTERNAL RECONSTRUCTION 10 Hours

Alteration of Share Capital – Modes of Alteration - Internal Reconstruction – Conversion of Stock – Increase and Decrease of Capital – Reserve Liability.

UNIT III ACCOUNTING OF BANKING COMPANIES

15 Hours

Final Statements of Banking Companies (As Per New Provisions) - Non- Performing Assets -

Rebate on Bills Discounted- Profit and Loss a/c - Balance Sheet as Per Banking Regulation Act 1949.

UNIT IV CONSOLIDATED FINANCIAL STATEMENTS

10 Hours

Introduction-Holding & Subsidiary Company-Legal Requirements Relating to Presentation of Accounts -Preparation of Consolidated Balance Sheet (Excluding Inter-Company Holdings).

UNIT V LIQUIDATION OF COMPANIES

15 Hours

Meaning-Modes of Winding Up – Preparation of Statement of Affairs and Deficiency Accounts - Order of Payment – Liquidators Remuneration- Liquidator’s Final Statement of Accounts.

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom’sLevel
CO 1	Recall the basic concepts and relate it to corporate accounting.	K1, K2
CO 2	Apply the accounting treatment for amalgamation, absorption ,and reconstruction	K3
CO 3	Analyze the develop the application skills.	K4
CO 4	Evaluate the techniques of preparing balance sheet of various concerns.	K5
CO 5	Develop and prepare company accounts, bank accounts, etc. independently.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	2	3	3
CO4	3	2	2	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 60 % Medium Correlation: 40% Low Correlation - Nil

Textbooks

- S.P. Jain and K.L Narang (2019), *Advanced Accountancy*, Kalyani Publishers, New Delhi.
- Dr. K.S .Raman and Dr. M.A (2018), Arulanandam , *Advanced Accountancy*, Vol. II, Himalaya Publishing House, Mumbai.

Reference Books

- B.Raman,(2021), *Corporate Accounting*, Taxmann, New Delhi
- M.C.Shukla(2018),*Advanced Accounting*,S.Chand, New Delhi

E- Resources

- <https://www.accountingnotes.net/amalgamation/amalgamation-absorption-and-reconstruction-accounting/126>
- <https://www.slideshare.net/debchat123/accounts-of-banking-companies>

**E- COMMERCE
UCOO414**

Semester : IV
Category : Discipline Specific Elective
Class & Major : II B.Com /B.ComCA

Credit :3
Hours/Week :4
Total hours : 52

COURSE OBJECTIVES

CO No.	To enable the students
CO1	Understand the basic concepts of electronic commerce
CO2	Develop working knowledge of various Business models in emerging E-commerce areas
CO3	Analyze the various the internet marketing technologies
CO4	Evaluate the benefits of implementation of EDI
CO5	Develop an ethical E-commerce business.

UNIT I INTRODUCTION TO E-COMMERCE

10 Hours

Defining E - Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Main Components of E-Commerce; Functions of Electronic Commerce - Process of E-Commerce - Types of E- Commerce; The World Wide Web.

UNIT II E-COMMERCE BUSINESS MODELS

10 Hours

E-commerce Business Models, Major Business to Consumer (B2C) Business Models, Major Business to Business (B2B) Business Models, Business Models in Emerging E-Commerce Areas

UNIT III TECHNOLOGY & SERVICES

10 Hours

The Internet Audience and Consumer Behavior, Basic Marketing Concepts, Internet Marketing Technologies – Marketing Strategy - E services: Categories of E-services, Web-Enabled Services, Information-Selling on the Web.

UNIT IV ELECTRONIC DATA INTERCHANGE & SECURITY

12hours

Benefits of EDI, EDI Technology, EDI Standards, EDI Communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System - Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web Server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.

UNIT V ETHICS IN E-COMMERCE

10 Hours

Issues in E Commerce Understanding Ethical, Social and Political Issues in E-Commerce: A Model for Organizing the Issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical Principles Privacy and Information Rights: Information Collected at E-

Commerce Websites.

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understanding of the principles, concepts, and dynamics of e-commerce, evolution, and impact on businesses and consumers.	K1, K2
CO2	Develop entrepreneurial skills and strategic thinking to identify e-commerce opportunities, evaluate market trends.	K3
CO3	Apply with e-commerce laws, regulations, and compliance requirements related to consumer protection.	K4
CO4	Analyze the ethical considerations and social responsibilities related to e-commerce.	K5
CO5	Build various e-commerce platforms, technologies, and tools used for online storefronts, payment processing, and inventory management.	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	1	1
CO2	3	3	2	2	1	1
CO3	3	2	3	1	1	1
CO4	3	2	2	2	3	1
CO5	3	3	3	3	3	3

High Correlation: 43.3 % Medium Correlation: 30 % Low Correlation: 26.7 %

Textbooks

- Kenneth C. Laudon(2021), *E-Commerce: Business, Technology, Society*, 4 the Edition, Pearson Education Limited, New Delhi
- S. J. Joseph(2021), *E-Commerce: an Indian perspective*, PHI Learning Pvt. Ltd., New Delhi

Reference Books

- Agarwala, K.N. and D. Agarwala,(2020), *Business on the Net : What's and How's of E-Commerce*, McMillan Publisher India Pvt. Ltd., Chennai
- Ravi Kalkota,(2020), *Frontiers of E-Commerce*, TM, Pearson Education Limited, New Delhi

E- Resources

- <https://www.investopedia.com/terms/e/ecommerce.asp>
- <https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic-ecommerce-marketing-concepts/>

SERVICE MARKETING

UCOD405/UCCD405

Semester : IV
Category : Discipline Specific SEC
Class & Major : II B.Com & B.Com CA

Credit : 2
Hours/Week : 2
Total Hours : 26

Course Objectives

CO No.	To enable the students
CO 1	Understand the nature and concepts of service.
CO 2	Analyze the different types of marketing of services
CO 3	Apply the concept of CRM in Service Marketing
CO 4	Evaluate elements of marketing mix in service marketing
CO 5	Develop service marketing skills

UNIT-I-INTRODUCTION

6 Hours

Growth of the Service Sector - Nature and Concept of Service - Classification of services – Characteristics of Services and their marketing implications.

UNIT-II SERVICE MARKETING PROCESS

5 Hours

Marketing strategies for service firms with special reference to information, communication, Consultancy, advertising, professional services, after sales service, recruitment training and Tourism.- Essential Elements of marketing mix in Service marketing.

UNIT- III SERVICE MARKETING MIX

5 Hours

Product support services - Pricing of services - Problems of Service quality management – Customer Expectations - Innovation in services

UNIT-IV EXTENDED SERVICE MARKETING MIX

5 Hours

People, Process, and physical evidence – Nature - Types - Marketing of insurance - Mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V CRM IN SERVICE MARKETING

5 Hours

CRM - Identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Text Books

- Helen Wood Ruffe, (2020), *Services Marketing*, Macmillan India, New Delhi.
- Balaji B, (2019), *Services Marketing and Management*, S.Chand & Co., New Delhi.

Reference Books

- Christopher Lovelock, (2018), *Services Marketing*, Pearson Education. New Delhi.
- Bateson E.G., (2018), *Managing Service Marketing - Text and Readings*, Dryden Press, Hinsdale, New York.
- Philip Kotler, (2019), *Marketing Professional Services*, Prentice Hall, New Jersey, USA.
- Payne, (2019), *The Essence of Service Marketing*, Prentice Hall, New Delhi.

Course Outcomes

CO	Upon completion of these course, the students will be able to	Blooms Level
CO1	Understand the concept of service and Classify the different types marketing of services.	K1& K2
CO2	Apply the service marketing mix for different services	K3
CO3	Examine the different types of mutual funds	K4
CO4	Evaluate the benefits of various insurances policies	K5
CO5	Adapt the CRM strategies to present scenario	K6

CO-PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3	3
CO2	2	2	3	2	2	3
CO3	3	2	3	3	2	3
CO4	3	2	3	3	3	3
CO5	3	2	3	3	3	3

High Correlation: 83.33 % % Medium Correlation: 16.67 % Low Correlation:Nil

MICRO SMALL MEDIUM ENTERPRISES UCOU406/UCCU406

Semester : IV
Category : Discipline Specific
Class& Major: II B.Com/ II B.Com CA

Credit :2
Hours/Week : 2
Total Hours : 26

Course Objectives

CONo.	Toenable the students
CO-1	Understand the significance of MSMEs in economic development.
CO-2	Analyze the legal and regulatory framework governing MSMEs.
CO-3	Develop a comprehensive business plan for a small enterprise.
CO-4	Apply financial management techniques to MSMEs.
CO-5	Design effective marketing strategies for small businesses.

UNIT I: INTRODUCTION FOR SMALL AND MEDIUM ENTREPRENEURSHIP 5 Hours

Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs.

UNIT II: SETTING UP OF SMES

6 Hours

Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies, Rural entrepreneurship – Women

entrepreneurship.

UNIT III: INSTITUTIONS SUPPORTING MSME

5 Hours

Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions. Institutional aids for entrepreneurship development Role of DST,SIDCO,NSIC,IRCI,NIDC,SIDBI,SISI,SIPCOT,Entrepreneurialguidancebureaus.

UNIT IV MANAGEMENT OF MSME

5 Hours

Management of Product Line; Communication with clients– Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies — Evaluating entrepreneurial performance

UNITV ROLE OF GOVERNMENT IN PROMOTING ENTREPRENEURSHIP 5 Hours

MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Text Books

- Vasant Desai,(2013),*Small Scale Industries and Entrepreneurship*, Himalaya Publishing House.
- Poornima M Charanthimath(2006), *Entrepreneurship Development Small Business Enterprises*, Pearson.

Reference Book

- PaulBurns&JimDewHunt(2018),*SmallBusinessEntrepreneurship*,PalgraveMacmillan publishers,
- SumanKalyan Chaudhury(2013),*Micro Small and Medium Enterprises in India Hardcover*, Raj Publications.

Course Outcome

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO 1	Understand the significance and role of MSMEs in economic development	K1, K2
CO 2	Develop entrepreneurial skills necessary for starting and managing MSMEs.	K3
CO 3	Analyze case studies to derive insights for MSME management.	K4
CO 4	Determine principles and techniques applicable to MSMEs, including budgeting, financial planning, and accessing sources of finance.	K5
CO 5	Formulate effective marketing and sales strategies for MSME products/services.	K6

CO -PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	1	2	1
CO2	3	3	3	1	2	1
CO3	3	2	3	2	2	1
CO4	3	2	2	3	1	1
CO5	3	3	3	3	3	3

High Correlation:46.7 %Medium Correlation 30 % Low Correlation: 23.33 %

III& IVEVALUATION COMPONENTSOF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core Course-V	UCCM309 UCOM309	Corporate Accounting I	Assignment	Problem Solving
	Core Course-VI	UCCM310 UCOM310	Company Law	Case study	Seminar
	Discipline Specific(SEC4)	UCCD301	Entrepreneurship	Assignment	Create a Product
	Discipline Specific Elective	UCOO311	EXIM Procedures and Documentation	Assignment	Seminar
	Discipline Specific	UCOU303/ UCCU303	Basics of Business Correspondence	Assignment	Drafting a Business Letter
IV	Core Course-VII	UCOM413 UCCM413	Corporate Accounting II	Assignment	Problem Solving
	Discipline Specific Elective	UCOO414	E-Commerce	Case Study	Seminar
	Discipline Specific SEC	UCOD405 UCCD405	Service Marketing	Case Study	Seminar
	Discipline Specific	UCOU406/ UCCU406	Micro and Small Medium Enterprises	Assignment	Drafting a proposal

PG & RESEARCH DEPARTMENT OF COMMERCE

PREAMBLE

PG: Programme profile and the syllabi of Courses Offered in Semester III & IV along with III and IV Evaluation Components (with effect from 2023- 2025 Batch onwards)

Programme Specific Outcomes (PSO)

PSO	Upon completion of the Programme ,the students will be able to
PSO 1	Understand the advanced theories, methodologies, and current trends within the specialized field of study.
PSO 2	Identify underlying assumptions that frame thinking and actions in commerce-related scenarios, demonstrating the ability to recognize implicit beliefs influencing decision-making
PSO 3	Apply advanced project management skills to successfully plan, execute, and evaluate complex business projects within the commerce domain.
PSO 4	Analyze and critically assess issues of social concern related to commerce, including economic disparities, ethical business practices, and corporate social responsibility.
PSO5	Evaluate and critically assess the application of ethical principles within the specialized field of commerce, considering the complexities of business decision-making.
PSO6	Design and develop independent research projects and develop strategies, to get employability in the in the field of commerce and industry.

PROGRAMME PROFILE M.Com.

Semester	Category	Course Code	Course Title	Contact Hrs/ Week	Credits Min/Max
I	Core Course I	PCOM109	Business Finance	5	4
	Core Course II	PCOM110	Digital Marketing	5	4
	Core Course III	PCOM111	Banking and Insurance	5	4
	Elective Course I	PCOO101	Operations Research	5	3
	Elective Course II	PCOO102	Strategic Human Resource Management	5	3
	Skill Enhancement Course(NME)	PCOE101	NME	3	2
	Skill Enhancement Course	PCOR110	Advance Excel	2	2
TOTAL				30	22
II	Core Course IV	PCOM211	Strategic Cost Management	5	4
	Core Course V	PCOM212	Corporate Accounting	5	4
	Core Course VI	PCOM213	Setting up of Business Entities	5	4
	Elective Course III	PCOO201	Business Ethics and Corporate Sustainability	4	3
	Elective Course IV	PCOO202	Logistics and Supply Chain Management	4	3

	Core Industry Module - I	PCOM214	Capital Market	4	3
	Skill Enhancement course(Discipline)	PCOD201	Project Management	3	2
	Service Learning		Service Learning	-	1
	Internship, Field Visit	PINS201	Internship/ Field Visit	-	2
TOTAL				30	26
III	Core Course VII	PCOM308	Taxation	5	4
	Core Course VIII	PCOM309	Research Methodology	4	3
	Core Course IX	PCOM310	Computers in Business	4	3
	Elective Course V	PCOO301	Strategic Management	4	3
	Elective Course VI	PCOO302	Service Marketing	3	3
	Core Industry Module - II	PCOM311	Global Marketing	4	3
	Skill enhancement course Interdisciplinary	PCOI301	Consumer Behaviour	4	2
	Online Course	PONL301	Online Course	2	2
TOTAL				30	23
IV	Core Course X	PCOM412	Corporate and Economic Laws	5	4
	Core Course XI	PCOM413	Human Resource Analytics	5	4
	Core Course XII	PCOM414	International Business	5	4
	Elective Course VII	PCOO 401	Organizational Behavior	5	3
	Project	PCOP401	Project with Viva	6	4
	Skill Enhancement Course(Proficiency Skill)	PCOC401	NET / SET Commerce	4	2
	Summer Internship	PINS401	Internship/ Field Visit	-	-/2
			TOTAL	30	21/23
		TOTAL	120	92/94	

NON-MAJORELECTIVE
These courses are offered to all except M.Com

Semester	Category	Course Code	Course Title	Contact/ Week	Credit
					Min/ Max
I	Skill Enhancement	PCOE107	Export Import Procedures	3	2
II	Skill Enhancement	PCOE201	Project Management	3	2
III	Skill Enhancement	PCOE301	Competitive Exam for NET/SET	3	2
IV	Skill Enhancement	PCOE401	SPSS Package	3	2

TAXATION
PCOM308

Semester: III

Category: Core Course VII

Class : II M.COM

Credit : 4

Hours/Week : 5

Total Hours: 65

Course Objectives:

CO No.	To enable the students
CO1	Identify the basic concepts, definitions and terms related to Income Tax.
CO2	Create employability to the students in the commercial tax practices
CO3	Carry out assessment of companies and determine their tax liability
CO4	Understand the appeals, offences and penalties with respect to GST
CO5	Learn tax planning concepts and apply the same

UNIT I ASSESSMENT OF PERSONS

15 Hours

Concept of Income - Basic Concepts – Definitions - Residential Status of Individual, HUF, AOP, Firm & Company- Exempted Incomes- Deductions.

Tax Exemptions for Agricultural Income-Deductions to be made in computing total income (80G, 80GGB & 80GGC, 80IA, 80IAB, 80IAC, 80IB, 80IBA, 80ID, 80IE, 80JJA, 80JJAA, 80LA, 80M, 80P, 80PA) – Assessment of Firms, AOP, BOI, Company and Co-operative society.

UNIT II TAX RETURNS AND TAX PLANNING

15 Hours

Return of income: Statutory obligation, Return Forms, Time for filing of return, Revised return, Modified return–Assessment -Tax Deducted at Source - Advance payment of Tax: Persons liable to pay, Due date, Computation - Payment in pursuance of order of Assessing Officer, Consequences on non-payment. – Tax planning, Tax avoidance and Tax evasion - Tax planning and specific management decisions: Make or buy, Own or lease, Retain or replace, Shut down or continue.

UNIT III INTERNATIONAL BUSINESS TAXATION

10 Hours

International business taxation - Taxation of Non-resident - Double taxation relief - Transfer pricing and other anti-avoidance measure - Application and interpretation of tax treaties (Double taxation avoidance agreement - DTAA) - Equalization levy.

UNIT IV GOODS AND SERVICES TAX

13 Hours

Goods and Services Tax: GST Act, 2017 - Registration – Procedure for registration under Schedule III -Assessment of GST- Self-assessment – Provisional assessment – Scrutiny of returns – Assessment of non filers of returns – Assessment of unregistered persons – Assessment in certain special cases – Tax Invoice – Credit and Debit Notes – Payment of Tax – Input Tax Credit - Anti profiteering – Filing of Returns- Penalties – Prosecution – Appeal and Revision.

UNIT V CUSTOMS ACT, 1962

12 Hours

Customs Act, 1962: Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition of Importation and Exportation of goods – Valuation of goods for Customs Duty – Transaction Value – Assessable Value – Computation of Assessable Value and Customs Duty.

Problem : 60 % Theory : 40 %

Text Books

- Gaur, V.P. and Narang, D.B. (2020). *Income Tax Law & Practice*. Kalyani Publishers. Ludhiana.
- Hariharan, T.(2020). *Income Tax*. Vijay Nichole Imprint Pvt. Ltd. Chennai.

Reference Books

- Singhania, V.K. (2020) *Students Guide to Income Tax*. Taxmann Publication Pvt. Ltd. New Delhi.
- Dinkar and Pagre.(2020). *Income Tax Law & Practice*. Sultan Chand & Sons. New Delhi.

E-Resources:

- <https://incometaxindia.gov.in>
- <https://www.taxmann.com> › research › direct-tax-laws

Course Outcomes:

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understand the concept of Income and relate it to rules, procedures exempted income and deductions.	K1, K2
CO2	Develop working knowledge on International Business taxation, GST & Customs Act and prepare tax returns.	K3
CO3	Analyze and carryout the various procedurals treatments relating to taxation.	K4
CO4	Appraise the benefits of taxation and tax planning.	K5
CO5	Adapt the taxation rules and predict the penalty for non-compliances.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 73.33 % Medium Correlation : 26.67% Low Correlation : Nil

RESEARCH METHODOLOGY

PCOM 308

Semester : III

Credit : 3

Category: Core Course VIII

Hours/Weeks : 4

Class & Major: II M.COM

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO-1	Understand the fundamentals of research
CO-2	Construct theoretical design and formulate hypotheses
CO-3	Evaluate the data collection techniques
CO-4	Perform parametric and non-parametric tests
CO-5	Enhance report writing skills and develop ethical conduct in research

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY

10 Hours

Research: Definition – Objectives – Motivations for research – Types of research – Maintaining objectivity in research – Criteria of good research – Applications of research in business –

Formulating a research problem – Literature Review – Reasons for review – Reference management tools - Identification of research gap – Framing of objectives.

UNIT II HYPOTHESIS TESTING AND RESEARCH DESIGN **10 Hours**

Hypothesis – Formulation of hypothesis – Testing of hypothesis – Type I and Type II errors – Research design – Types of research design - Methods of data collection: Census, Sample survey, Case study – Sampling: Steps in sampling design, Methods of sampling – Testing of reliability and validity – Sampling errors.

UNIT III DATA COLLECTION **11 Hours**

Variable: Meaning and types - Techniques of data collection – Primary data: Meaning, Advantages and limitations – Techniques: Interview, Schedule, Questionnaire, Observation – Secondary Data: Meaning and sources.

UNIT IV DATA ANALYSIS **11 Hours**

Data Analysis – Uni-variate Analysis: Percentile, Mean, Median, Mode, Standard deviation, Range, Minimum, Maximum, Independent sample t-test – Bi-variate analysis: Simple correlation, Simple Regression, Chi-square, Paired samples t-test, ANOVA, Man-Whitney test – Wilcoxon signed rank test – Kruskal Wallis test (Simple problems)

UNIT V PREPARATION OF RESEARCH REPORT **10 Hours**

Report preparation – Guidelines and precautions for interpretation – Steps in Report writing - Style of research reports (APA, MLA, Anderson, Harvard) – Mechanics of report writing – Ethics in Research – Avoiding plagiarism – Plagiarism checker tools – Funding agencies for business research.

Text Books

- Tripathi, (2014) “Research Methodology in Management and Social Sciences”. SultanChand & Sons, New Delhi.
- Kothari C.R and Gaurav Garg, (2020) “Research Methodology” – Methods and Techniques. New Age International (P) Limited, New Delhi.
- Krishnaswami and Ranganathan, (2011) “Methodology of Research in Social Sciences”, Himalaya Publishing House, Mumbai.

Reference Books

- Donald R. Cooper, Pamela S. Schindler and J.K.Sharma, “Business Research Methodology”, 12th Edition, Tata Mcgraw Hill, Noida (UP).
- Sashi K.Guptha and Parneet Rangi,(2018) “Research Methodology” , KalyaniPublisher, Ludhiana.

E-Resources:

- https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_research_method_final.pdf
- <https://ccsuniversity.ac.in/bridge-library/pdf/MPhil%20Stats%20Research%20Methodology-Part1.pdf>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understand the concepts of research methodology and outline its benefits.	K1, K2
CO2	Identify theoretical design and formulate research hypotheses.	K3
CO3	Analyze the various statistical tools.	K4
CO4	Assess the different statistical tools applicable to their study.	K5
CO5	Create and run consultancy for research or go for publication business.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 76.67 % Medium Correlation : 23.33 % Low Correlation- Nil

COMPUTERS IN BUSINESS**PCOM310**

Semester : III

Credit : 3

Category : Core IX

Hours/Week : 4

Class & Major : II M.COM

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Understand the fundamentals of SPSS
CO 2	Compare the values obtained in t-test and ANOVA
CO 3	Perform regression and non-parametric tests
CO 4	Create company, groups and ledgers and obtain financial statements using Tally Prime

UNIT I INTRODUCTION TO SPSS**11 Hours**

Opening a data file in SPSS – Variable view – Data view – Entering data into the data editor – Saving the data file– Table creation – Descriptive statistics: Percentile values, Measures of central tendency, Measures of dispersion, Distribution – Cronbach’s Alpha test – Charts and graphs - Editing and copying SPSS output.

UNIT II PARAMETRIC TESTS IN SPSS**10 Hours**

Compare means: One-sample t-test, Independent Samples t-test, Paired-samples t-test and One-way ANOVA, Two-way ANOVA - Correlation: Bi-variate, Partial and Multiple. Simple linear regression.

UNIT III NON-PARAMETRIC TESTS IN SPSS**10 Hours**

Chi-square test - Mann Whitney’s test for independent samples – Wilcoxon matched pairs sample test– Friedman’s test – Wilcoxon signed rank test – Kruskal Wallis test

UNIT IV INTRODUCTION TO TALLY PRIME**11 Hours**

Tally Prime: Introduction – Starting Tally Prime – Creation of a Company - Selecting company - Shutting a company - Altering company– Creating Accounting groups and ledgers – Vouchers – Practical problems for a new and existing business and not-for profit organisation. Accounting reports: Introduction – Displaying Trial balance, Profit and Loss Account, Balance sheet, Day book, Purchase register, Sales register, Cashflow/Funds flow and ratio analysis – Practical problems

UNIT V INVENTORY AND GST IN TALLY PRIME**10 Hours**

Inventory: Introduction to Inventory Masters – Creation of stock group – Creation of Godown – Creation of unit of measurement – Creation of stock item – Entering inventory details in Accounting vouchers – Practical problems. GST: Introduction – Enabling GST – Defining tax details – Entries in Accounting vouchers – View invoice report – Practical problems.

Text Books

- Statistics, Routledge, 6th Edition, U.K
- Official Guide to Financial Accounting using TallyPrime (2021), BPB Publication, Delhi

Reference Books

- Kulas John, Renata Garcia Prieto Palacios Roji, Smith Adams (2021), IBM SPSS Essentials: Managing and Analysing Social Sciences Data, 2nd Edition, John Wiley & Sons Inc., New York
- Rajathi. A, Chandran. P (2011), SPSS for You, MJP Publishers, Chennai

E-Resources:

- www.taxmann.com
- <https://www.incometax.gov.in>
- <https://resource.cdn.icai.org/65958bos53217mod1ip.pdf>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understand the concepts of SPSS & Tally and relate the concepts to business.	K1, K2
CO2	Apply the SPSS package & Tally Prime in research.	K3
CO3	Analyze the benefits of SPSS & Tally based business.	K4
CO4	Appraise the risk in operation of SPSS & Tally in business.	K5
CO5	Adapt to the changing technological scenario.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 76.67 % Medium Correlation : 23.33% Low Correlation : Nil

STRATEGIC MANAGEMENT**PCOO301**

Semester : III

Credit : 3

Category : Elective Course V

Hours/Week : 4

Class & Major : II M.COM

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Understand strategic management and its levels and phases
CO 2	Analyze the dynamics of competitive strategic management techniques
CO 3	Familiarize with the business and functional level strategies
CO 4	Gain knowledge on organizational and strategic leadership
CO 5	Apply latest concepts in strategy implementation and control

UNIT I INTRODUCTION TO STRATEGIC MANAGEMENT

10 Hours

Introduction to Strategic Management: Meaning and Nature of Strategic management, Framework of Strategic management, Strategic Levels in Organizations, Phases of strategic management, Benefits and challenges of strategic Management in global economy.

UNIT II TECHNIQUES FOR STRATEGIC MANAGEMENT

11 Hours

Dynamics of Competitive Strategy: Corporate governance- Role of Board of directors and top management in corporate governance; Agency and Stewardship theory, Situational Analysis- SWOT analysis, TOWS Matrix, Portfolio Analysis - BCG, GE, and ADL matrix - Strategic Management Process: Strategic Planning, Strategic Intent – Vision, Mission and Objectives, Strategy Formulation .

UNIT III DIFFERENT LEVELS OF STRATEGIES

11 Hours

Business Level Strategies: Competitive Strategies at Business Level, Michael Porter's Generic Strategies, Best-Cost Provider Strategy - Functional Level Strategies: Marketing Strategy, Financial Strategy, Operations Strategy, Human Resource Strategy, Research and Development.

UNIT IV ORGANISATION AND STRATEGIC LEADERSHIP

10 Hours

Organisation and Strategic Leadership: Organisation Structure, Strategic Business Unit, Strategic Leadership, Strategy Supportive Culture, Entrepreneurship and Intrapreneurship, Strategic Leadership across organizations..

UNIT V STRATEGY IMPLEMENTATION AND CONTROL

10 Hours

Strategy Implementation and Control: Strategy Implementation, Strategic Choice, Strategic Control, Strategy Audit, Business Process Reengineering, Benchmarking, Six Sigma and contemporary practices in strategic management.

Text Books

- Prasad L. M., (2018), "Strategic Management", 7th Edition, Sultan Chand & Sons, New Delhi.
- Cherunilam, Francis, (2021), "Strategic Management" 8th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.

Reference Books

- Jeyarathanam M., (2021), "Strategic Management" 7th Edition, Himalaya Publishing House Pvt. Ltd, Mumbai
- Ghosh P.K. (2014), "Strategic Management", 14th Edition, Sultan Chand & Sons, New Delhi

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Explain the concepts of strategic management and relate it to the nature and scope of strategic management.	K1, K2
CO2	Identify competency gaps in the organization or department.	K3
CO3	Analyze the strategy management appropriate to the organization.	K4
CO4	Interpret the feedback to stakeholders to help them reach personal and organizational goals.	K5
CO5	Formulate strategic management cost and benefit analyze for an organization.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 76.67% Medium Correlation: 23.33% Low Correlation: Nil

SERVICE MARKETING

PCOO302

Semester : III
Category : Elective Course VI
Class & Major : II M.COM

Credit : 3
Hours/Week : 3
Total Hours : 39

Course Objectives

CO No.	To enable the students
CO 1	Understand the concepts of service marketing and its phases.
CO 2	Apply the service marketing mix for different services
CO 3	Familiarize with the comprehensive overview of the new developments in Service Marketing
CO 4	Analyze the dynamics of competitive marketing strategies
CO 5	Enhance the student's knowledge with regard to CRM.

UNIT I EVOLUTION AND GROWTH

8 Hours

Evolution and growth of service sector- Concept of Service – Characteristics of services – Components and tangibility spectrum- classification of services –Reasons for growth of service sectors- significance of service marketing.

UNIT II SERVICEMARKETING MIX

8 Hours

- Service marketing mix –Service Product – Pricing Mix –Promotional mix Delivery of services through intermediaries, People, Process and physical evidence.

UNIT III: TYPES OF MARKETING IN SERVICE FIRMS

8 Hours

Internal Marketing- meaning- objectives- role of internal marketing- External marketing – Difference between internal and external marketing- Service Triangle – Relationship marketing – Transaction marketing – Customer relationship marketing.

UNIT IV: QUALITY OF SERVICE

8 Hours

Quality of service dimensions – Five dimensions of service quality – Gap analysis – Causes of customer gap – Key factors leading to the customer gap.

UNIT V: MARKETING OF SERVICES

7 Hours

Marketing of banking services, financial services, consultancy, tourism, hospital, telecommunication, education, transport services, care taking etc.

Text Books

- Valerie Zeithmal, Mary Jo Bitner (2016),Services Marketing McGraw Hill International Edition
- Natarajan.L (2021) Service Marketing , Margham Publications, Chennai.

References

- Christopher.H.Lovelock(2004),ServiceMarketing-,5thEdition,Pearson.
- Barronand Harris(1995),Service Marketing, MacMillan

E-Resources:

- Rao(2005),Service Marketing Pearson.
- https://onlinecourses.nptel.ac.in/noc20_mg07/preview
- <https://shodhganga.inflibnet.ac.in/handle/10603/23696>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Understand the concept of service and Classify the different types marketing of services.	K1& K2
CO2	Apply the service marketing mix for different services	K3
CO3	Examine the different types of marketing.	K4
CO4	Evaluate the benefits of various marketing strategies.	K5

CO5	Adapt the CRM strategies to present scenario	K6
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CO PSO MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	2	2	2
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3

High Correlation: 76.67% Medium Correlation :23.33% Low Correlation :Nil

GLOBAL MARKETING PCOM311

Semester : III

Credit :3

Category : Core Industry Module-II

Hours/Week:4

Class &Major: M.COM

Total Hour: 52

Course Objectives

CONo.	To enable the students
CO-1	Understand the Foundations of Global Marketing
CO-2	Utilize Market Entry Strategies
CO-3	Analyze Global Consumer Behavior
CO-4	Interpret Product and Brand Management
CO-5	Develop Digital Marketing in a Global Context

UNIT I INTRODUCTION TO GLOBAL MARKETING

11 Hours

Definition and scope of global marketing- Evolution of global markets and its impact on businesses - Global marketing environment: cultural, economic, political, and technological factors- Importance of global marketing in the contemporary business landscape

UNIT II MARKET ENTRY STRATEGIES

11 Hours

Different modes of entering international markets- Exporting, licensing, franchising, joint ventures, and strategic alliances- Market selection criteria and entry barriers- Risk assessment and mitigation strategies in global markets

UNIT III GLOBAL CONSUMER BEHAVIOR

10 Hours

Cultural influences on consumer behavior- Cross-cultural communication and advertising- Global market segmentation and targeting- Trends and challenges in understanding diverse consumer

needs

UNIT IV PRODUCT AND BRAND MANAGEMENT IN GLOBAL MARKETS 10 Hours

Product adaptation vs. standardization- Building global brands and brand positioning- Product life cycle in the international context- Challenges and opportunities in managing global product portfolios

UNITV DIGITAL MARKETING IN A GLOBAL CONTEXT 10 Hours

The role of digital platforms in global marketing- E-commerce and its impact on international trade- Social media strategies for global brands- Managing online reputation and crisis in the global marketplace

Textbooks:

- Keegan, W. J., & Green, M. C. (2020). *Global Marketing* (9th ed.). Pearson.
- Cateora, P. R., Gilly, M. C., & Graham, J. L. (2018). *International Marketing* (17th ed.). McGraw-Hill Education.

Reference Materials:

- Hollensen, S. (2021). *Global Marketing: A Decision-Oriented Approach* (8th ed.). Pearson.
- Kotabe, M., & Helsen, K. (2020). *Global Marketing Management* (7th ed.). Wiley.

E-RESOURCES

- www.the-gma.com
- <https://journals.sagepub.com/home/jig>
- <https://www.emeraldgrouppublishing.com/journal/imr>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO-1	Define and describe the importance of studying global marketing	K2
CO-2	Prepare international, Multinational and global marketing management.	K3
CO-3	Analyze cognitive knowledge of the skills required in identifying, assessing and selecting global market opportunities	K4
CO-4	Assess effective global marketing strategies and determine the method of entering a market.	K5
CO-5	Create the knowledge global marketing mix programs for different environments.	K6

CO/ PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 76.67 % Medium Correlation : 23.33 %Low Correlation:Nil

CONSUMER BEHAVIOUR

PCOI 301

Semester : III
Category : SEC
Class & Major : II M.COM

Credit : 2
Hours / Week: 4
Total Hours : 52

Course Objectives

CONo.	To enable the students
CO-1	Understand the basic concepts of Consumer Behavior
CO-2	Utilize the different theories of consumer behavior
CO-3	Analyze Global Consumer Behavior
CO-4	Interpret the consumer behavior in different settings
CO-5	Develop the attitude of consumers and communication process at Global Context

UNIT –I: INTRODUCTION TO CONSUMER BEHAVIOUR 10 Hours

Definition, scope, consumer roles, history of consumer behavior and the marketing concept, contributing disciplines and application of consumer behavior. Market segmentation: need, types – geographic, demographic, psychographic and life style. Product positioning: need and strategy

UNIT- II: FACTORS INFLUENCING CONSUMER BEHAVIOUR 11 Hours

Consumer motivation: needs, goals, motive arousal, reactions to frustration. Consumer Personality: nature, influences on consumer behavior. Consumer emotions: nature, uses in advertising. Consumer Perception and its implications. Consumer Learning: Classical and Instrumental theories in the context of consumer behavior

UNIT- III: CONSUMER ATTITUDE AND COMMUNICATION PROCESS 11Hours

Attitude: functions, Tri-component attitude model and Katz's models of attitude and attitude change. Post purchase attitude change: cognitive dissonance theory and attribution theory. Marketing communication: process, barriers, types of communication systems, Source,

Message and Medium of Communication.

UNIT- IV: CONSUMERS IN THEIR SOCIAL AND CULTURAL SETTINGS 10 Hours

Reference group: Nature, types and influences on consumers. Family life cycle stages, nature of household and purchases and family decision making and resolving conflict. Social class: Nature of social class, symbols of status, concept of money and social class, social class categories and consumer behaviour.

UNIT- V: CONSUMER DECISION MAKING 10 Hours

Consumer decision: Stages in consumer decision process – situational influence, problem recognition, information search, evaluation of alternatives and selection, outlet selection and purchase and post purchase action. Organizational Buyer: nature, market structure and pattern of demand, characteristics, decision approach, purchase pattern and organizational buyer decision process.

Text Books:

- Kumar, A and Singh, K. *Consumer Behaviour and Marketing Communication: An Indian Perspective*. 1st Edition. Dreamtech Press, New Delhi. 2013

Reference Books

- Schiffman LG and Kanuk LL, (2007) *Consumer Behaviour*, 9 edition, Prentice-Hall of India Pvt Ltd, New Delhi, India.
- Batra Satish K and S.H.H. Kazmi, (2007) *Consumer Behaviour – Text and Cases, Excel Books*, A-45, Naraina, Phase I, New Delhi, India.

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom’s Level
CO1	Recall and summarize the concepts and features of consumer behavior.	K1, K2
CO2	Develop the strategy, perception, attitude and culture for organizational effectiveness	K3
CO3	Examine the changing role consumer behavior.	K4
CO4	Explain the principles and perception consumer behavior.	K5
CO5	Develop a competitive knowledge on leadership and decision making.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3

CO5	3	3	3	3	3	3
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High Correlation: 76.67 % Medium Correlation : 23.33% Low Correlation : Nil

CORPORATE AND ECONOMIC LAWS

PCOM 412

Semester :IV

Credit :4

Category : Core Course X

Hours/Week : 5

Class & Major : II MCOM

Total hours :65

Course Objectives

CO No.	To enable the students
CO 1	Understand unethical competitive practices and forums for redressal of consumer disputes.
CO 2	Prepare current and capital account transactions and dealings in foreign currency under FEMA
CO 3	Discover the procedure for obtaining patents and copyright under The Copyright and Patents Act
CO 4	Evaluate offences and punishment for money laundering under Prevention of Money Laundering Act
CO 5	Rewrite the registration and related procedures under Real Estate Act

UNIT I INTRODUCTION TO ECONOMIC LAWS

13 Hours

Objectives – Economic development- Industrial policy – Industrial policy 1991 – Policy measures for Small, Tiny, Handloom and Village industries. –SME sector – initiatives by Government. Foreign Exchange Management Act, 1999: Introduction – Definitions – Current Account transactions – Capital Account transactions

UNIT II COMPETITION ACT, 2002

13 Hours

Competition Act, 2002: Objective – Prohibition of Agreements, Prohibition of Abuse of Dominant Position - Regulation of combinations - Competition Commission of India: Duties, Powers and Functions of Commission - Appellate Tribunal.

UNIT III CONSUMER PROTECTION ACT, 2019

13 Hours

The Consumer Protection Act, 2019: Objects; Rights of consumers – Consumer Dispute Redressal Commissions - Consumer protection councils – Procedure for admission to complaints – Appeal against orders.

UNIT IV PREVENTION OF MONEY LAUNDERING ACT, 2002

13 Hours

Prevention of Money Laundering Act, 2002: Offence of money laundering –Punishment for money laundering –Attachment, adjudication and confiscation - Obligations of Banking Companies, Financial Institutions and Intermediaries –Summons, Search and Seizure– Appellate Tribunal.

UNIT VREAL ESTATE (REGULATION AND DEVELOPMENT) ACT, 2016 13 Hours

Real Estate (Regulation and Development) Act, 2016: Introduction - Salient features of the Act - Registration of Real Estate Project – Registration of Real Estate agents – Functions and duties of promoter – Rights and duties of Allottees – Offences, penalties and adjudication – Specimen agreement for sale to be executed between the promoter and the allottee.

Text Books

- Munish Bandari (2022), A Textbook on Corporate and Economic Laws, 33rd Edition, Bestword Publications, New Delhi
- Amit Vohra and Rachit Dhingra (2022), Economic, Business and Commercial Laws, 18th Edition, Bharat Book House, Siliguri
- Pankaj Garg (2021), Taxmann’s Corporate and Economic Laws, 7th Edition, Taxmann Publications, New Delhi

Reference Books

- Sekar G and Saravana Prasath B (2022), Students’ Handbook on Corporate and Economic Law, Commercial Law Publishers (India) Pvt.Ltd., New Delhi
- Taxmann (2021), FEMA & FDI Ready Reckoner, 15th Edition, Taxmann Publications, New Delhi
- Ahuja V.K. and Archa Vashishtha (2020), Intellectual Property Rights (contemporary Developments), Thomson Reuters, Toronto, (CAN)

E-Resources

- <https://resource.cdn.icai.org/67333bos54154-m3cp1.pdf>
- <https://resource.cdn.icai.org/67335bos54154-m3cp3.pdf>
- <https://resource.cdn.icai.org/68523bos54855-cp1.pdf>
- <https://resource.cdn.icai.org/68524bos54855-cp2.pdf>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom’sLevel
CO1	Recall the basic concepts and relate it to corporate world.	K1, K2
CO2	Apply the rules and regulations.	K3
CO3	Analyze and develop the application skills.	K4
CO4	Evaluate the procedure for admission of complaints and make appeals.	K5
CO5	Develop and prepare legal drafts independently.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 73.33 % Medium Correlation : 26.67 % Low Correlation : Nil

HUMAN RESOURCE ANALYTICS

PCOM413

Semester:IV

Category :Core Course XI

Class/Major : II M.COM

Credit : 04

Hours/Week : 05

Total hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Understand the concept and framework of human resource analytics
CO 2	Develop the process of human resource analytics and the relevant research tools
CO 3	Illustrate the evolution, types and design of HR metrics
CO 4	Deal with data collection and transformation
CO 5	Adopt tools and techniques for predictive modeling

UNIT I INTRODUCTION TO HUMAN RESOURCE ANALYTICS 13 Hours

Human Resource Analytics: Introduction – Concept – Evolution - Importance – Benefits – Challenges - Types of HR Analytics – HR Analytics Framework and Models.

UNIT IIBUSINESS PROCESS AND HR ANALYTICS 13 Hours

Business Process and HR Analytics: Introduction – Data Driven Decision Making in HR - Data Issues – Data Validity – Data Reliability - HR Research tools and techniques –Statistics and Statistics Modelling for HR Research.

UNIT III INTRODUCTION TO HR METRICS 13 Hours

HR Metrics: Introduction - Historical Evolution of HR metrics- Importance – Types of HR Metrics – Types of data - HR Metrics Design Principles — HR Scorecard – HR Dashboards.

UNIT IV ANALYTICS FOR HR 13 Hours

Analytics for HR system HR performance frameworks and measurement systems; Measuring HR Climate and People Management Capabilities; Competency Management Frameworks & Competency Mapping, Integration of competency-based HR System. Measuring HR Effectiveness, the HR Scorecard

UNIT VHR ANALYTICS AND PREDICTIVE MODELLING 13 Hours

HR Analytics and Predictive Modelling: Introduction – HR Predictive Modelling – Different phases – Predictive analytic tools and techniques – Information for Predictive analysis - Software solutions - Predictive Analytic Models for Quantitative Data - Steps involved in predictive

analytics.

Text Books

- Nishant Uppal (2020), Human Resource Analytics Strategic Decision Making, 1st Edition, Pearson Education Pvt. Ltd., Chennai
- Sarojkumar and Vikrant Verma (2022), HR analytics, Thakur Publication Pvt. Ltd, Lucknow.

Reference Books

- Ramesh Soundararajan and Kuldeep Singh (2019), Winning on HR analytics, Sage publishing, New Delhi
- Anshul Saxena (2021), HR analytics: quantifying the intangible, 1st Edition, Blue Rose publishers, New Delhi

E-Resources

- <https://hbr.org/webinar/2017/06/leveraging-hr-analytics-in-strategic-decisions>
- <https://www.mbaknol.com/human-resource-management/human-resource-metrics/>
- <https://www.managementstudyguide.com/hr-metrics-and-workforce-analysis.htm>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Recall the concepts and Compare the various frameworks of human resource analytics.	K1, K2
CO2	Apply the human resource analytics tools.	K3
CO3	Examine the evolution, types and design of HR metrics..	K4
CO4	Appraise the compliance of regulatory framework regarding HR analytics..	K5
CO5	Prepare a plan for independent business consultancy.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 73.33% Medium Correlation : 26.67 % Low Correlation - Nil

INTERNATIONAL BUSINESS

PCOM 414

Semester : IV
Category : Core Course XII
Class/Major : II M.COM

Credit : 04
Hours/Week: 05
Total hours: 65

Course Objectives

CO No.	To enable the students
CO 1	Understand the concepts of International Business and International Business Environment
CO 2	Analyse the different theories of International Business.
CO 3	Understand the legal procedures involved in International Business.
CO 4	Evaluate the different types of economic integrations.
CO 5	Analyse the operations of MNCs through real case assessment.

UNIT I INTRODUCTION TO INTERNATIONAL BUSINESS

13 Hours

International Business -Meaning, Nature, Scope and Importance- Stages of internationalization of Business-Methods of entry into foreign markets: Licensing- Franchising- Joint Ventures-Strategic Alliances- Subsidiaries and Acquisitions - Framework for analyzing international business environment- Domestic, Foreign and Global Environment-Recent Developments in International Business.

UNIT II THEORIES OF INTERNATIONAL TRADE

13 Hours

Theories of International Trade; Commercial Policy Instruments tariff and non-tariff measures; Balance of payment account and its components. WTO – Its objectives, principles, organizational structure and functioning, An overview of other organizations – UNCTAD, World Bank and IMF.

UNIT III LEGAL FRAMEWORK OF INTERNATIONAL BUSINESS

13 Hours

International Financial Environment: International financial system and institutions; Foreign exchange markets, spot market, spot rate quotations, bid ask spreads, trading in spot market, cross exchange rates ; Forward market; Rate, long and short forward position, forward premium and discount, Arbitrage, Hedging and Speculation

UNIT IV MULTI-LATERAL AGREEMENTS AND INSTITUTIONS

13 Hours

Multi-Lateral Agreements and Institutions: Economic Integration – Forms: Free Trade Area, Customs Union, Common Market and Economic Union-Regional Blocks: Developed and Developing Countries-NAFTA- EU-SAARC, ASEAN-BRICS- OPEC-Promotional role played by IMF-World Bank and its affiliates- IFC, MIGA and ICSID – ADB-Regulatory role played by

WTO and UNCTAD.

UNIT V Multinational Companies (MNCs) and Host Countries

13 Hours

Multinational Companies (MNCs) and Host Countries: MNCs – Nature and characteristics. Decision Making-Intra Firm Trade and Transfer Pricing – Technology Transfer- Employment and labour relations- Management Practices- Host Country Government Policies-International Business and Developing countries: Motives of MNC operations in Developing Countries (Discuss case studies)-Challenges posed by MNCs.

Text Books

- Charles W.L. Hill, International Business: Competing in the Global Market Place, Mc Graw Hill, NewYork
- Charles W. L. Hill, Chow How Wee & Krishna Udayasankar, International Business: An Asian Perspective- Mc Graw Hill, New York

Reference Books

- Donald Ball, Michael Geringer, Michael Minor & Jeanne McNett, International Business: The Challenge of Global Competition, Mc Graw Hill Education, NewYork
- Alan M Rugman & Simon Collinson, International Business: Pearson Education, Singapore

E-Resources:

- <https://www.icsi.edu/media/webmodules/publications/9.5%20International%20Business.pdf>
- https://ebooks.lpude.in/commerce/mcom/term_3/DCOM501_INTERNATIONAL_BUSINESS.pdf
- <https://www.shobhituniversity.ac.in/pdf/econtent/International-Business-Unit-1-Dr-Neha-Yajurvedi.pdf>

Course Outcomes

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Recall the concepts and relate the importance of international business..	K1, K2
CO2	Apply the ethical decision making & sustainability, based on various theories.	K3
CO3	Examine the different types of economic integrations.	K4
CO4	Judge the legal framework and its impact across economic, environment and social realms.	K5
CO5	Design a plan for ethical decision making & international sustainability.	K6

Course Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	2	3	3	3	3
CO3	3	2	3	3	3	3

CO No.	Upon completion of these course, the students will be able to	Bloom's Level
CO1	Recall and summarize the concepts and features of Organization.	K1, K2
CO2	Develop the organization structure, perception, attitude and culture for organizational effectiveness	K3
CO3	Examine the changing organizational climate.	K4
CO4	Explain the principles and perception of organizational behavior.	K5
CO5	Develop a competitive knowledge on leadership and organizational culture.	K6

CO- PSO- MAPPING

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	2	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 66.67% Medium Correlation : 23.33% Low Correlation Nil

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core Course VII	PCOM308	Taxation	Problem Solving	Seminar
	Core Course VIII	PCOM309	Research Methodology	Assignment	Problem Solving
	Core Course IX	PCOM310	Computers in Business	Assignment	Seminar
	Elective Course V	PCOO301	Strategic Management	Seminar	Case Study
	Elective Course VI	PCOO302	Service Marketing	Case study	Seminar
	Core Industry Module - II	PCOM311	Global Marketing	Assignment	Case Study
IV	Skill enhancement course Interdisciplinary	PCOI301	Consumer Behaviour	Assignment	Seminar
	Core Course X	PCOM412	Corporate and Economic Laws	Assignment	Seminar
	Core Course XI	PCOM413	Human Resource Analytics	Assignment	Seminar
	Core Course XII	PCOM414	International Business	Seminar	Webinar to attend
	Elective Course VII	PCOO 401	Organizational Behavior	Seminar	Case Study

PG AND RESEARCH DEPARTMENT OF PHYSICS

PREAMBLE:

UG: Programme profile & the syllabi of courses offered in semester I to IV along with III and IV evaluation components (with effect from 2023 – 2026 batch onwards).

PROGRAM SPECIFIC OUTCOME (PSO)

PSO	On completion of this programme, students will be able to
PSO1:	Understand the core knowledge in physics, including the major premises of Classical Mechanics, Electricity and Magnetism and Modern Physics.
PSO2:	Develop proficiency in mathematics derivatives and the mathematical concepts needed for a proper understanding of Physics.
PSO3:	Apply advanced tools, equipments and laboratory skills in physics experiments draw logical conclusions and interpret the results into a research report.
PSO 4:	Enhance their oral and written scientific communication, and will prove that they can think critically and work independently.
PSO 5:	Adapt physics concepts to solve simple problems in electronic devices and perform jobs in the relevant field.
PSO 6:	Establish themselves in research and technology through mini project, projects, working models, demonstrations, etc.,

PROGRAMME PROFILE B.Sc. Physics

Sem	Part	Category	Course Code	Course Title	Hours/week	Min/Max credits
I	I	Tamil/ Hindi/ French	UTAL110/ UHIL101/ UFRL101	General Tamil-I/ Hindi-I/ French-I	5	3
	II	English	UENL111	General English - I	5	3
	III	Core course I	UPHM108	Properties of Matter and Sound	5	4
		Core course II	UPHR103	Properties of Matter	5	4
		Elective Course – GE I	UPMAA115	Mathematics I	4	3
	IV	SEC-Foundation Course	UPHF101	Introductory Physics	2	2
		SEC –I/NME -I			2	2
		AECC/Soft Skill -I	USKS103	Communicative English	2	2
Total					30	23

II	I	Tamil/ Hindi/ French	UTAL210	General Tamil-II/ Hindi-II/ French-II	5	3
	II	English	UENL211	General English -II	5	3
	III	Core course III	UPHM206	Heat, Thermodynamics And Statistical Physics	5	4
		Core course IV	UPHR204	Practical –II	5	4
		Elective course GE - II	UMAA223	Mathematics II	4	3
	IV	SEC-II/NME-II			2	2
		SEC III/DS I	UPHD201	Communication Physics	2	2
		AECC/Soft Skill -II	USKS203	Soft skill	2	2
		Internship	UINS201			1/2
V	Extension activity / Physical education (outside class hours)			-	1/2	
VI	Value added course (outside class hours)			-	1/2	
Total					30	24/29
III	I	Tamil/ Hindi/ French	UTAL310/ UHIL301/ UFRL301	General Tamil –III/ Hindi –III/ French - III	5	3
	II	English	UENL311	General English -III	5	3
	III	Core course V	UPHM306	General Mechanics And Classical Mechanics	4	4
		Core course VI	UPHR306	Core Practicals III	3	2
		Elective course GE - III	UPHA301	Allied Physics-I	3	2
		Elective course GE Practical I	UPHR302/ UPHR303	Allied for Chemistry Practical I / Allied for Mathematics Practical I	2	2
	IV	Skill enhancement course (Discipline subject specific)	UPHU302	Nanoscience and Nano Technology	2	2
	IV	Skil enhancement course (entrepreneurship)	UPHD301	Physics of Music's	2	1
	IV	Value education	-	-	2	2
IV	Ability enhancement Compulsory course (AECC 1) soft Skill - III			2	2	
Total					30	23
IV	I	Tamil/ Hindi/ French	UTAL410/ UHIL401/ UFRL401	General Tamil –IV/ Hindi –IV/ French - IV	5	3
	II	English	UENL411	General English -IV	5	3
	III	Core course VII	UPHM408	Optics and Spectroscopy	5	4
		Core course VIII	UPHR406	Core Practical IV	3	3
		Elective course GE - IV	UPHA401	Allied Physics-II	3	2
		Elective course GE Practical II	UPHR402/ UPHR403	Allied for Chemistry Practical II / Allied for Mathematics Practical II	3	2
	IV	Skill Enhancement Course (Discipline / Subject Specific)	UPHD401	Energy Physics	2	2
NME-online course				2	2	

	IV	Ability Enhancement Compulsory Course (AECC 1) Soft Skill-IV			2	2	
	III	Internship	UINS401	-	-	-/2	
		Extension Activity/ Physical Education (60 Hours Compulsory)			-	-	-/2
		Value Added Course, (Outside class hours)	-		-	-	-/2
Total					30	23/29	
V	III	Core course IX	UPHM510	Atomic Physics and Lasers	5	4	
		Core Course X	UPHM511	Relativity and Quantum Mechanics	5	4	
		Core Course XI	UPHO503	Materials Science	5	4	
		Core XII project	UPHP501	Project with viva voce	4	3	
		Elective course DS V	UPHO504	Lasers and Fiber optics	5	3	
		Elective Course DS VI			4	3	
	IV	Environmental studies			2	2	
Total					30	24	
VI	III	Core Course XIII	UPHM612	Nuclear and Particle Physics	5	4	
		Core Course XIV	UPHM614	Solid State Physics	5	4	
		Core Course XV	UPHO605	Digital Electronics and Microprocessor 8085	5	4	
		Core Course XVI	UPHR606	Core Practicals VI	3	2	
		Elective Course – DS VII	UPHO606	Numerical Methods and C Programming	4	2	
		Elective Course – DS VIII			4	3	
		Comprehensive Viva – Voce	UPHM605	Comprehensive Viva - Voce	-	1	
	IV	Professional Competency Skill	UPHC601		4	2	
	III	Internship	UINS601	Internship	-	-/2	
		Extension Activity / Physical Education			-	-/2	
		Value added Course (Outside class hours)			-	-	
	Total					30	22/26
Grand total					180	140/155	

**LIST OF COURSE OFFERED TO OTHER DEPARTMENTS
ALLIED COURSE**

Semester	Part	Category	Course Code	Course Title	Contact Hrs per week	Credits
III	III	Allied	UPHA301	Allied Physics-I	3	2
III	III	Allied	UPHR302/ UPHR303	Allied for Chemistry Practical I / Allied for Mathematics Practical I	2	2
IV	III	Allied	UPHA401	Allied Physics-II	3	2
IV	III	Allied	UPHR402/ UPHR403	Allied for Chemistry Practical II / Allied for Mathematics Practical II	3	2

NON – MAJOR ELECTIVE COURSE

Semester	Part	Category	Course Code	Course title	Contact Hrs per Week	Credits
						Min/Max
I	IV	Non Major Elective	UPHE101	Physics For Everyday Life	2	2
II	IV	Non Major Elective	UPHE201	Home Electrical Installation	2	2

Extract Credit Earning Provision

Semester	Category	Course Code	Course title	contact Hrs per week	Credits
					Min/Max
II	Core	UINS201	Internship	30/60 Hours	1/2
IV	Core	UINS401	Internship	30/60 Hours	1/2
VI	Core	UINS601	Internship	30/60 Hours	1/2
IV	Core	UCHS601			1

PROPERTIES OF MATTER AND SOUND

UPHM108

Semester	: I	Credit	: 4
Category	: Core I	Hours /Weeks	: 5
Class & Major	: I B.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Make the students learn and understand the properties of materials and acoustics.
CO-2	Explore the basic laws governing the behavior of matter in everyday life.
CO-3	Explain one dimensional motion and dependence of force on position, velocity and time
CO-4	Study the basic properties and production of ultrasonic's by different methods.
CO-5	Understand the basic properties of solids, liquids and gases and also the concepts of sound.

UNIT-I: ELASTICITY

12 Hours

Hooke's law – stress-strain diagram – elastic constants –Types of elasticity - Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)

UNIT-II: BENDING OF BEAMS

13 Hours

Cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope

UNIT-III: FLUID DYNAMICS

14 Hours

Surface tension: Definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature - Drop weight method of determination the S.T of a liquid.

Viscosity: Definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula–variation of viscosity with temperature - Fick's law of diffusion – Analogy with heat conduction

UNIT-IV: WAVES AND OSCILLATIONS

14 Hours

Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles –

Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance.

Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus

UNIT-V: ACOUSTICS OF BUILDINGS AND ULTRASONICS

12 Hours

Intensity of sound – Noise pollution - decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings.

Ultrasonic waves: Production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – Production of ultrasonic waves - application of ultrasonic waves

TEXT BOOKS:

- D. S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co.
- R. Murugesan, 2004, Properties of matter, S. Chand & Co.,
- Brijlal and Subramanian, 2006, Properties of matter –S. Chand & Co.,
- R. Murugesan, 2012, Properties of Matter, S. Chand & Co.

REFERENCEBOOKS

- C. J. Smith, 1960, General Properties of Matter, Orient Longman Publishers.
- H. R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, R. Chand & Co.
- A. P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.
- D. Halliday, Resnick and J Walker, 2001, Fundamental of Physics, , 6th Edition, Wiley, New York.

E- Resources

- <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
- <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
- <https://www.youtube.com/watch?v=gT8Nth9NWPM>
- <https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s>
- <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
- <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
- <http://www.sound-physics.com/>
- <http://nptel.ac.in/courses/112104026/>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Acquire the basic principle of properties of matter and the underlying concepts of bending behavior of beams.	K1
CO – 2	Understand the fluid dynamics that gives the fundamental knowledge over many practical applications.	K2
CO – 3	Identify the materials suitable for construction of buildings, based on the moduli of elasticity.	K3
CO – 4	Analyze the characteristics of sound and the requisites of good acoustics.	K4
CO – 5	Determine the modulus of elasticity through different experimental techniques.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	2	1	3
CO-2	3	3	3	2	1	3
CO-3	3	3	3	2	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 73% Medium Correlation- 10% Low Correlation –17%

PHYSICS FOR EVERDAY LIFE UPHE101

Semester	: I	Credit	: 2
Category	: NME -I	Hours /Weeks	: 2
Class & Major	: I B.Sc physics	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the basic properties of materials.
CO-2	Study the functionality of vision corrective lenses, polaroid glasses, UV protective glass, polaroid cameras, color photography, holography, and laser technology.
CO-3	Introduce the knowledge about Solar energy system.
CO-4	Explore the concept of the solar constant and its implications in harnessing solar energy. Study the general applications of solar energy, including solar water heaters and photovoltaic cells.
CO-5	Understand their significant discoveries, innovations, and impact on physics and related fields.

UNIT-I: MECHANICAL OBJECTS 5 Hours

Spring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.

UNIT-II: OPTICAL INSTRUMENTS AND LASER 5 Hours

Vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.

UNIT-III: PHYSICS OF HOME APPLIANCES 5 Hours

Bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners.

UNIT-IV: SOLAR ENERGY 5 Hours

Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells

UNIT-V: INDIAN PHYSICIST AND THEIR CONTRIBUTIONS 6 Hours

C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution

to science and technology

TEXT BOOKS

- U. Ammara, 2019, the Physics in our Daily Lives, Gugucol Publishing, Hyderabad.
- W. Lawin, 2011, for the love of physics, Free Press, New York.

E- Resources

- <https://excerpts.numilog.com/books/9782759807055.pdf>
- https://fiisikis.weebly.com/uploads/5/4/9/3/54939617/for_the_love_of_physics.pdf

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Understand the basic concepts related to Mechanics, Optics, Magnetism, Electricity and Sound.	K1
CO-2	Acquire a better understanding of these fundamental concepts through experiments.	K2
CO-3	Develop a foundational understanding of basic physics principles and their direct relevance to everyday experiences.	K3
CO-4	Distinguish between the principles of television sets and air conditioners.	K4
CO-5	Explain how Physics applies to phenomena in the world around them.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	2	2	3	3
CO-2	3	1	3	2	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	2	3	3	3	3

High Correlation- 73% Medium Correlation- 17% Low Correlation – 10%

**INTRODUCTORY PHYSICS
UPHF101**

Semester	: I	Credit	: 2
Category	: Foundation Course	Hours /Weeks	: 2
Class & Major	: I B.Sc Physics	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understanding Vector and Scalar Analysis apply these concepts to physical quantities and understand the significance of units and dimensions in physics.
CO-2	Identify and analyze different types of forces such as gravitational, electrostatic, magnetic, and mechanical forces.
CO-3	Explore different forms of energy and their transformations, and apply

	conservation principles to analyze types of collisions and angular momentum in practical scenarios.
CO-4	Compare light and sound waves, and understand oscillatory phenomena like free, forced, and damped oscillations.
CO-5	Study the properties of materials such as conductors, insulators, and their applications in daily life.

UNIT-I: Vector and Scalars Analysis

5 Hours

Vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants.

UNIT-II: Fundamental of Force

5 Hours

Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces.

UNIT-III: Conservation of Law

5 Hours

Different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples.

UNIT-IV: Motions

5 Hours

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations.

UNIT-V: Surface Tension

6 Hours

Surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric.

TEXT BOOKS

- D. S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co.,
- Brijlal & N. Subrahmanyam, 2003, Properties of Matter, S. Chand & Co.,

REFERENCEBOOKS

- H. R. Gulati, 1977, Fundamental of General Properties of Matter, 5th Edition, S. Chand & Co.

E- Resources

- <http://hyperphysics.phyastr.gsu.edu/hbase/permot2.html><https://science.nasa.gov/ems>
- https://eesc.columbia.edu/courses/eesc/climate/lectures/radiation_hays

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Recall the concept of vectors to gain insights into physics principles and adeptly address problem-solving challenges.	K1
CO – 2	Classify the various forces found in nature while studying phenomena	K2

	associated with each of these forces.	
CO – 3	Identify the measurement of energy in various processes and establish correlations between momentum, velocity, and energy.	K3
CO – 4	Distinguish between the various motion types encountered in diverse courses and grasp their underlying principles.	K4
CO – 5	Explain the diverse properties of matter, detailing their behaviors, and establish connections with various associated physical parameters.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	2	2	1	3
CO-2	3	3	2	2	1	3
CO-3	3	3	3	3	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 70% Medium Correlation- 13% Low Correlation –17%

Practical – I Properties of Matter UPHR103

Semester	: I	Credit	: 3
Category	: Course Practical	Hours /Weeks	: 3
Class & Major	: I B.Sc Physics	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Gain proficiency in determining mechanical properties such as rigidity modulus, Young's modulus, and moment of inertia using various experimental methods like torsional pendulum, stretching of wires, and bending techniques.
CO-2	Learn experimental techniques for measuring surface tension, interfacial surface tension, viscosity, and critical pressure in fluid dynamics.
CO-3	Acquire skills in conducting experiments to determine physical constants like acceleration due to gravity (g) using compound pendulums, bifilar pendulums, and other methods.
CO-4	Apply experimental methods such as load-deformation graphs, oscillation methods, and static torsion to determine these properties.
CO-5	Enhance problem-solving skills and critical thinking through hands-on experiments focusing on mechanical properties, fluid dynamics, and material science.

Experimental

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of moment of inertia of an irregular body.
4. Verification of parallel axes theorem on moment of inertia.
5. Verification of perpendicular axes theorem on moment of inertia.

6. Determination of moment of inertia and g using Bifilar pendulum.
7. Determination of Young's modulus by stretching of wire with known masses.
8. Verification of Hook's law by stretching of wire method.
9. Determination of Young's modulus by uniform bending – load depression graph.
10. Determination of Young's modulus by non-uniform bending – scale & telescope.
11. Determination of Young's modulus by cantilever – load depression graph.
12. Determination of Young's modulus by cantilever – oscillation method
13. Determination of Young's modulus by Koenig's method – (or unknown load)
14. Determination of rigidity modulus by static torsion.
15. Determination of Y, n and K by Searle's double bar method.
16. Determination of surface tension & interfacial surface tension by drop weight method.
17. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
18. Determination of critical pressure for streamline flow.
19. Determination of Poisson's ratio of rubber tube.
20. Determination of viscosity by Poiseuille's flow method.
21. Determination radius of capillary tube by mercury pellet method.
22. Determination of g using compound pendulum.

TEXT BOOKS

- S. L. Gupta, V. Kumar, 2017, Practical Physics, Gupta and Kumar, Pragati Prakasan.
- R. Srinivasan K. R Priolkar, 2014, Kit Developed for doing experiments in Physics- Instruction manual, Indian Academy of Sciences.

REFERENCE BOOKS

- S. P Singh, 2017, PragatiPrakasan, Advanced Practical Physics.
- D. Chattopadhyay, C. R Rakshit, 2015, An advanced course in Practical Physics, New Central Book Agency Pvt. Ltd.

E- Resources

- https://www.ebookselibrary.com/book-detail/higher_education/physics/Advanced-Practical-Physics-Vol.-I-278
- <https://narasinhaduttcollege.edu.in/ws/wp-content/uploads/2016/05/Physics-14-11-19.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Acquire the basic principles of properties of matter and underlying the concepts of bending behaviour beams.	K1
CO – 2	Understand the theory and practical applications of properties of matter and electronics in their day to day life.	K2
CO – 3	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K3
CO – 4	Compare the experiments with their applications.	K4
CO – 5	Explain the basic laws to study the spectral properties and optical properties of the given prism.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
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CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3
CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77% Medium Correlation- 07% Low Correlation –16%

**HEAT, THERMODYNAMICS AND STATISTICAL PHYSICS
UPHM206**

Semester	: II	Credit	: 4
Category	: Course II	Hours /Weeks	: 5
Class & Major	: I B.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Equip the basic properties of heat and statistical parameters.
CO-2	Will learn about the conversion of temperature in Celsius, Kelvin and Fahrenheit scales.
CO-3	Practical exhibition and explanation of transmission of heat in good and bad conductor.
CO-4	Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation.
CO-5	Understand the basic properties of thermodynamics and its properties.

UNIT-I: CALORIMETRY 13 Hours

specific heat capacity – specific heat capacity of gases C_p & C_v – Meyer’s relation – Joly’s method for determination of C_v – Regnault’s method for determination of C_p

LOW TEMPERATURE PHYSICS: Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect – Boyle temperature – temperature of inversion – liquefaction of gas by Linde’s Process – adiabatic demagnetization - Air conditioner – Refrigerator

UNIT-II: THERMODYNAMICS-I 13 Hours

Zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine – Carnot’s engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines - Maxwell’s Thermodynamic relations

UNIT-III: THERMODYNAMICS-II 13 Hours

Second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – thermodynamical scale of temperature – Maxwell’s thermodynamical relations – Clausius-Clapeyron’s equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death

UNIT-IV: HEAT TRANSFER 13 Hours

Modes of heat transfer: conduction, convection and radiation. Conduction: thermal conductivity – determination of thermal conductivity of a good conductor by Forbes’s method – determination of thermal conductivity of a bad conductor by Lee’s disc method.

Radiation: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law – Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.

UNIT-V: STATISTICAL MECHANICS

13 Hours

Definition of phase-space – micro and macro states – ensembles – different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Identical Particles - Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics – expression for distribution function – comparison of three statistics.

TEXT BOOKS:

- Brijlal & N. Subramaniam, 2000, Heat and Thermodynamics, S. Chand & Co.
- R. Murugesan, 2001, Properties of Matter by S. Chand & Co., New Delhi.
- D. Halliday, R. Resnick and J. Walker, 2001, Fundamentals of Physics by 6th Edition, Wiley, New York.

REFERENCE BOOKS

- J. B. Rajam & C. L. Arora, 1976, Heat and Thermodynamics, 8th Edition, S. Chand & Co. Ltd.
- D. S. Mathur, 2005, Heat and Thermodynamics, Sultan Chand & Sons.
- Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand & Co.
- R. Halliday & Walker, 2010, Fundamentals of Physics, 6th Edition.
- Sears, Zemansky, Hugh D. Young, Roger, A. Freedman, 2021, University Physics with Modern Physics 15th Edition, Pearson.

E- Resources

- https://youtu.be/M_5KYncYNyc
- <https://www.youtube.com/watch?v=4M72kQulGKk&vl=en>

COURSE OUTCOMES:

Co. No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Learn to differentiate between temperature and heat, delve into thermometry for practical measurements of high and low temperatures, and understand the relationship between heat capacity and specific heat.	K1
CO – 2	Able to analyze the efficiency of thermodynamic systems through problem-solving, gaining insights into thermodynamic properties such as enthalpy and entropy.	K2
CO – 3	Apply Carnot's engine efficiency and examine the consequences of the laws of thermodynamics on diesel and petrol engines.	K3
CO – 4	Examine the phenomenon of thermal conductivity and its application to materials exhibiting both efficient and poor heat conduction.	K4
CO – 5	Interpret classical statistical concepts like phase space, ensemble, and the Maxwell-Boltzmann distribution law. Construct a statistical interpretation for Bose-Einstein and Fermi-Dirac distributions and apply them to quantum particles like photons and electrons.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	2	1	3
CO-2	3	3	3	2	1	3
CO-3	3	3	3	2	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 70% Medium Correlation- 13% Low Correlation – 17%

HOME ELECTRICAL INSTALLATION UPHE201

Semester	: II	Credit	: 2
Category	: NME II	Hours /Weeks	: 2
Class & Major	: I B.Sc Physics	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	Enable the students
CO-1	To grasp the concepts of electronics.
CO-2	Introduce the fundamentals of optoelectronic devices.
CO-3	Introduce fundamental concepts of electronics and circuitry.
CO-4	Knowledge on electrical instruments, installations and domestic wiring techniques with safety precautions and servicing.
CO-5	Understand the techniques involved in advanced repairing of household equipment's.

UNIT-I: SIMPLE ELECTRICAL CIRCUITS 5 Hours

Charge, current, potential difference, resistance – simple electrical circuits – DC ammeter, voltmeter, ohmmeter – Ohm's law – difference between DC and AC – advantages of AC over DC – electromagnetic induction - transformers – inductors/chokes – capacitors/condensers – impedance – AC ammeter, voltmeter –symbols and nomenclature.

UNIT-II: TRANSMISSION OF ELECTRICITY 5 Hours

Production and transmission of electricity – concept of power grid – Series and parallel connections – technicalities of junctions and loops in circuits –transmission losses (qualitative) – roles of step-up and step-down transformers – quality of connecting wires – characteristics of single and multicore wires.

UNIT-III: ELECTRICAL WIRING 5 Hours

Different types of switches – installation of two way switch – role of sockets, plugs, sockets - installation of meters – basic switch board – electrical bell – indicator – fixing of tube lights and fans – heavy equipment like AC, fridge, washing machine, oven, geyser, jet pumps – provisions for inverter – gauge specifications of wires for various needs.

UNIT-IV: POWER RATING AND POWER DELIVERED 5 Hours

Conversion of electrical energy in to different forms – work done by electrical energy – power rating of electrical appliances – energy consumption – electrical energy unit in kWh – calculation of EB bill – Joule's heating – useful energy and energy loss – single and three phase connections – Measures to save electrical energy – energy audit.

UNIT-V: SAFETY MEASURES**6 Hours**

Insulation for wires – colour specification for mains, return and earth – Understanding of fuse and circuit breakers – types of fuse: kit-kat, HRC, cartridge, MCB, ELCB – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock – fire safety for electric current.

TEXT BOOKS:

- R. Cauldwell, 2014, Wiring a House: 5th Edition.
- Black & Decker, 2018, Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press.
- K. Ryan, 2022, Complete Beginners Guide to Rough in Electrical Wiring.

E-Resources

- https://books.google.com/books/about/Wiring_a_House.html?id=sqH-zgEACAAJ
- https://books.google.com/books/about/Black_Decker_Advanced_Home_Wiring_5th_Ed.html?id=d95HDwAAQBAJ
- https://books.google.com/books/about/Complete_Beginners_Guide_to_Rough_in_Ele.html?id=IUHwzgeEACAAJ

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Acquire knowledge of series and parallel connections to the electronic circuit in home electrical installation.	K1
CO-2	Understand the difference between DC and AC and types of switches.	K2
CO-3	Construct circuits for fuses and circuit breakers.	K3
CO-4	Examine the understanding of computing electricity bills.	K4
CO-5	Explain how Physics applies to phenomena in the home electrical installation around them.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	2	2	3	3
CO-3	3	1	3	2	3	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

High Correlation- 60%**Medium Correlation- 23%****Low Correlation – 17%**

**COMMUNICATION PHYSICS
UPHF201**

Semester	: II	Credit	: 2
Category	: Discipline Course	Hours /Weeks	: 2
Class & Major	: I B.Sc Physics	Total Hours	: 26

Course Objectives:

CO No.	To enable the students
CO-1	Understand the basic role of communication systems.
CO-2	Apply the Production, Reception and Transmission of AM & FM.
CO-3	Analyze the Existence of AM & FM in Communication System.
CO-4	Divide the concepts of satellite communication and their Applications.
CO-5	Comprehend the role of Modulated waves in Communication Systems.

UNIT-I: RADIO TRANSMISSION AND RECEPTION **5 Hours**

Transmitter – modulation types of modulation – amplitude modulation – limitations of amplitude modulation – frequency modulation – comparison of FM and AM – demodulation- essentials in demodulation – receivers: AM radio receivers – types of AM radio receivers – stages of super heterodyne radio receiver, advantages – FM receiver – difference between FM and AM receivers.

UNIT-II: FIBER OPTIC COMMUNICATION **5 Hours**

Introduction – basic principle of fiber optics – advantages – construction of optical fiber – classification based on the refractive index profile – classification based on the number of modes of propagation – losses in optical fibers – attenuation–advantages of fiber optic communication.

UNIT-III: RADAR COMMUNICATION **5 Hours**

Introduction - basic radar system –radar range – antenna scanning –pulsed radar system – search radar –tracking radar – moving target indicator Doppler effect-MTI principle – CW Doppler radar.

UNIT-IV: SATELLITE COMMUNICATION **5 Hours**

Introduction history of satellites – satellite communication system – satellite orbits – basic components of satellite communication system – commonly used frequency in satellite – communication –multiple access communication – satellite communication in India.

UNIT-V: MOBILE COMMUNICATION **6 Hours**

Introduction – concept of cell –basic cellular mobile radio system – cell phone – facsimile – important features of fax machine – application of facsimile – VSAT (very small aperture terminals) modem IPTV (internet protocol television) -Wi-Fi-4G (basic ideas).

TEXT BOOKS:

- V. K. Metha, 2013, Principles of Electronics, S. Chand & Co Ltd.,
- Singh and A.K. Chopra, 2013, Principles of communication Engineering, S. Chand & Co.,

REFERENCE BOOKS

- J. S. Chitode, 2020, Digital Communications, Unicorn publications.
- Senior John. M, 2009, Optical Fiber Communications: Principles and Practice, Pearson Education.

E-Resources

- https://www.tvu.edu.in/wp-content/uploads/2024/02/U28-B.Sc_-.Physics.pdf
- <https://shijuinpallotti.files.wordpress.com/2019/07/optical-fiber-communications-principles-and-pr.pdf>

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Acquire knowledge about the propagation of radio waves.	K1
CO-2	Acquire knowledge of fiber optic communication and their applications.	K2
CO-3	Model the generation and transmission of Amplitude Modulation and Frequency Modulation.	K3
CO-4	Classify the operation of Frequency Modulation.	K4
CO-5	Evaluate the performance of an AM receiver.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	3	3	2	3
CO-2	3	1	3	3	2	3
CO-3	3	1	3	3	2	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

High Correlation- 73%

Medium Correlation- 10%

Low Correlation – 17%

Practical – II UPHR204

Semester : II

Category : Course Practical II

Class & Major : I B.Sc Physics

Credit : 2

Hours /Weeks : 3

Total Hours : 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Develop the practical skills by applying the laws and concepts in physics experiments.
CO-2	Acquire knowledge through experiments related to frequency and sound waves.
CO-3	Comprehend the fundamental principles of heat transfer, including conduction, convection, and radiation.
CO-4	Gain experience in measuring latent heat and applying corrections for more accurate results, such as Barton's correction in Joule's electrical heating method.
CO-5	Learn to verify the laws of transverse vibrations and compare mass per unit length of different strings using Melde's apparatus.

Experimental

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of good conductor by Searle's method.
3. Determination of thermal conductivity of bad conductor by Lee's disc method.
4. Determination of thermal conductivity of bad conductor by Charlton's method.
5. Determination of specific heat capacity of solid.

6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method),
7. Determination of Latent heat of a vaporization of a liquid.
8. Determination of Stefan's constant for Black body radiation.
9. Verification of Stefan's-Boltzmann's law.
10. Determination of thermal conductivity of rubber tube.
11. Helmholtz resonator.
12. Velocity of sound through a wire using Sonometer.
13. Determination of velocity of sound using Kundt's tube.
14. Determination of frequency of an electrically maintained tuning fork
15. To verify the laws of transverse vibration using sonometer.
16. To verify the laws of transverse vibration using Melde's apparatus.
17. To compare the mass per unit length of two strings using Melde's apparatus.
18. Frequency of AC by using Sonometer.

TEXT BOOKS

- Gupta Kumar and Pragati Prakashan, 2018, Practical Physics.
- R. Srinivasan and K. R. Priolkar, 2018, Kit Developed for doing experiments in Physics- Instruction manual, Indian Academy of Sciences.

REFERENCE BOOKS

- S. P. Singh, Pragati Prakashan, 2017, Advanced Practical Physics.
- D. Chattopadhyay and C.R Rakshit, 2012, An advanced course in Practical Physics, New Central Book Agency Pvt. Ltd.,

E-Resources

- [https://www.ebookselibrary.com/book-detail/higher education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278](https://www.ebookselibrary.com/book-detail/higher%20education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278)
- <https://narasinhaduttcollege.edu.in/ws/wp-content/uploads/2016/05/Physics-14-11-19.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Acquire the basic principles of heat, sound and oscillations through physics experiments.	K1
CO – 2	Understand the theory and practical applications of oscillation and frequency in their day to day life.	K2
CO – 3	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems.	K3
CO – 4	Compare the experiments with their applications.	K4
CO – 5	Explain the basic laws to study the spectral properties and optical properties of the given prism.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3

CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77%

Medium Correlation- 7%

Low Correlation –16%

Semester III
GENERAL MECHANICS AND CLASSICAL MECHANICS
UPHM306

Semester	: III	Credit	: 4
Category	: Core III	Hours /Weeks	: 4
Class & Major	: II B.Sc Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Make the students learn and understanding the laws and principles of mechanics.
CO-2	Apply the concepts of forces existing in the system.
CO-3	Understand the forces of physics in everyday life.
CO-4	Study the basic properties of rigid body dynamics.
CO-5	Apply the Lagrangian equation to solve complex problems.

UNIT-I: LAWS OF MOTION

12 Hours

Newton's Laws– forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field – types of everyday forces in Physics.

Gravitation: Classical theory of gravitation–Kepler's laws, Newton's law of gravitation – Determination of G by Boy's method – Earth-moon system – weightlessness – earth satellites – parking orbit – earth density – mass of the Sun – gravitational potential – velocity of escape – satellite potential and kinetic energy –Einstein's theory of gravitation – introduction –principle of equivalence – experimental tests of general theory of relativity – gravitational red shift – bending of light – perihelion of mercury.

UNIT-II: CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM

10 Hours

Conservation of linear and angular momentum – Internal forces and momentum conservation – center of mass – examples – general elastic collision of particles of different masses – system with variable mass – examples – conservation of angular momentum – torque due to internal forces – torque due to gravity – angular momentum about center of mass – proton scattering by heavy nucleus.

UNIT-III: CONSERVATION LAWS OF ENERGY

10 Hours

Introduction – significance of conservation laws – law of conservation of energy concepts of work- power – energy – conservative forces – potential energy and conservation of energy in gravitational and electric field – examples –non-conservative forces – general law of conservation of energy.

UNIT-IV: RIGID BODY DYNAMICS

10 Hours

Translational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down an inclined plane – gyroscopic precision – gyrostatic applications.

UNIT-V: LAGRANGIAN MECHANICS

10 Hours

Generalized coordinates –degrees of freedom – constraints - principle of virtual work and D’ Alembert’s Principle –Lagrange’s equation from D’ Alembert’s principle – application –simple pendulum – Atwood’s machine.

TEXT BOOKS

- J. C. Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai.
- P. Durai Pandian, L. D. Pandian, M. Jayapragasam, 2005, Mechanics, 6th revised edition, S.Chand& Co.
- D. S. Mathur & P. S. Hemne, 2000, Mechanics, Revised Edition, S.Chand & Co.
- G. A. Dilisi, volume number 4, 2019, Classical mechanics, the Universal law of gravitation.

REFERENCEBOOKS

- H. David & R. Resnick, 1995, Physics Vol.I. New Age, International, Chennai.
- H. David, R. Resnick and W. Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi
- Gregory, 2018, classical mechanics, CUP.

E-SOURCES

- <https://nptel.ac.in/courses/115103115>
- <https://www.youtube.com/watch?v=p075LPq3Eas>
- https://www.youtube.com/watch?v=mH_pS6fruyg
- https://onlinecourses.nptel.ac.in/noc22_me96/preview
- <https://www.youtube.com/watch?v=tdkFc88Fw-M>
- https://onlinecourses.nptel.ac.in/noc21_me70/preview

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom’s level
CO – 1	Acquire the basic principle of Newton’s Law of motion, general theory of relativity, Kepler’s laws and Realize the basic principles behind planetary motion.	K1
CO – 2	Understand the fundamental knowledge of conservation laws.	K2
CO – 3	Apply the principles of conservation laws to determine the energy of different systems. Gain insight into distinguishing between conservative and non-conservative forces.	K3
CO – 4	Analyze the dynamics of rigid bodies and solve problems based on this concept.	K4
CO – 5	Explain the Lagrangian approach to mechanics and implement D'Alembert's principle.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	2	1	3
CO-2	3	3	3	2	1	3
CO-3	3	3	3	2	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 73%

Medium Correlation- 10%

Low Correlation –17%

CORE PRACTICALS-III ELECTRICITY UPHR306

Semester	: III	Credit	: 2
Category	: Course Practical-III	Hours /Weeks	: 3
Class & Major	: II B.Sc Physics	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Gain expertise in calibrating low and high range voltmeters and ammeters using potentiometers to ensure accurate measurements in various electrical experiments.
CO-2	Determine the field along the axis of a current-carrying circular coil and use this method to measure the Earth's magnetic field, providing practical insights into electromagnetism.
CO-3	Measure the specific conductance of electrolytes, which is vital for applications in electrochemistry and battery technology.
CO-4	Understand the principles of internal resistance of cells and measure it using potentiometers, enhancing knowledge in battery performance and efficiency.
CO-5	Develop skills in determining the figure of merit of galvanometers, which is essential for their accurate use in various experiments.

Experimental

1. Calibration of low range and high range voltmeter using potentiometer
2. Calibration of ammeter using potentiometer.
2. Measurement of low resistances using potentiometer.
3. Determination of field along the axis of a current carrying circular coil.
2. Determination of earth's magnetic field using field along axis of current carrying coil.
3. Determination of specific resistance of the material of the wire using PO box.
4. Determination of resistance and specific resistance using Carey Foster's bridge.
5. Determination of internal resistance of a cell using potentiometer.
6. Determination of specific conductance of an electrolyte.
7. Determination of e.m.f of thermo couple using potentiometer

8. Determination of capacitance using Desauty's bridge and B.G./Spot galvanometer/head phone.
9. Determination of figure of merit of BG or spot galvanometer.
10. Comparison of EMF of two cells using BG.
11. Comparison of capacitance using BG.

TEXT BOOKS

- Gupta Kumar and Pragati Prakasan, 2018, Practical Physics.
- R. Srinivasan and K. R. Priolkar, 2018, Kit Developed for doing experiments in Physics- Instruction manual, Indian Academy of Sciences.

REFERENCE BOOKS

- S. P. Singh, Pragati Prakasan, 2017, Advanced Practical Physics.
- D. Chattopadhyay and C.R Rakshit, 2012, An advanced course in Practical Physics, New Central Book Agency Pvt. Ltd.,

E-Resources

- <https://www.ebookselibrary.com/book-detail/higher-education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278>
- <https://narasinhaduttcollege.edu.in/ws/wp-content/uploads/2016/05/Physics-14-11-19.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Understand the low range and high range voltmeter using potentiometer.	K1
CO – 2	Acquire knowledge of low resistances using potentiometer.	K2
CO – 3	Develop the knowledge about earth's magnetic field using field along axis of current carrying coil.	K3
CO – 4	Examine about e.m.f of thermo couple using potentiometer.	K4
CO – 5	Interpret the analytical and observation ability in Physics Experiments.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3
CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77%

Medium Correlation- 07%

Low Correlation –16%

NANOSCIENCE AND NANO TECHNOLOGY UPHU302

Semester

: III

Credit

: 2

Category : **Discipline Specific Electives** **Hours /Weeks** : **2**
Class & Major : **II B.Sc physics** **Total Hours** : **26**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the basic properties of Nanomaterials.
CO-2	Explore the basic laws governing the behavior of Nanomaterial in everyday life.
CO-3	Introduce the knowledge about Solar energy system using nanoparticles.
CO-4	Develop skills in using advanced characterization techniques such as scanning probe microscopy, scanning tunneling microscopy, atomic force microscopy, scanning electron microscopy, transmission electron microscopy, powder X-ray diffraction (XRD), UV-visible spectroscopy, and photoluminescence spectroscopy.
CO-5	Explore the wide range of applications of nanomaterials in medicine, energy, sensors, and nanoelectronics.

UNIT-I: NANOSCIENCE AND NANOTECHNOLOGY **6 Hours**

Nanoscale– nature and nanostructures – nanostructures: 0D, 1D,2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene –SWCNT and MWCNT.

UNIT-II: PROPERTIES OF NANOMATERIALS **5 Hours**

Introduction –mechanical behavior –elastic properties – hardness and strength – ductility and toughness –superplastic behavior – optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – electrochemical properties – properties of CNTs.

UNIT-III: FABRICATION METHODS AND VACUUM TECHNIQUES **5 Hours**

Top-down and bottom-up approaches – electrochemical method – chemical & physical vapour depositions (CVD & PVD) – plasma arc discharge – sputtering – thermal evaporation – pulsed laser deposition – ball milling – lithography: photolithography – e-beam lithography – sol-gel methods – synthesis of CNT.

UNIT-IV: CHARACTERIZATION TECHNIQUES **5 Hours**

Scanning probe microscopy – scanning tunneling microscopy – atomic force microscopy – scanning electron microscopy – transmission electron microscopy –powder XRD method: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy.

UNIT-V: APPLICATIONS OF NANOMATERIALS **5 Hours**

Medicine: drug delivery – photodynamic therapy – molecular motors –energy: fuel cells –rechargeable batteries – supercapacitors– photovoltaics. Sensors: nanosensors based on optical and physical properties – electrochemical sensors – nanobiosensors. nanoelectronics: CNTFET – display screens – GMR read/write heads – nanorobots –applications of CNTs.

TEXT BOOKS:

- K. K. Chattopadhyay and A.N. Banerjee, (2012), Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt. Ltd.,
- M. A. Shah, Tokeer Ahmad (2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing House Pvt Ltd.
- Mick Wilson, et al (2005) Nanotechnology, Overseas Press.

REFERENCE BOOKS:

- Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. USA
- J.H.Fendler (2007) Nano particles and nano structured films; Preparation, Characterization and Applications, John Wiley & Sons
- B.S.Murty, et al (2012) Textbook of Nanoscience and Nanotechnology, Universities Press.

E-Resources

- https://books.google.com/books/about/Nanotechnology_For_Dummies.html?id=_flVjlrz6CQC
- https://backup.pondiuni.edu.in/sites/default/files/downloads/mtech_nano.pdf
- <https://link.springer.com/book/10.1007/978-3-642-28030-6>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Acquire knowledge regarding magnetic properties, superparamagnetism, and electrochemical properties.	K1
CO-2	Understand the basic nanostructures like 0D, 1D, 2D structures and its applications.	K2
CO-3	Utilize the synthesis technique of lithography, including photolithography and e-beam lithography.	K3
CO-4	Functions regarding powder XRD method include determining structure and conducting grain size analysis. UV-visible and photoluminescence analyses can also be performed.	K4
CO-5	Explain the concepts of supercapacitors, photovoltaics, and sensors, including nanosensors based on optical and physical properties.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	2	2	3	3
CO-2	3	1	3	2	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	2	3	3	3	3

High Correlation- 73%**Medium Correlation- 17%****Low Correlation – 10%**

**PHYSICS OF MUSICS
UPHD301**

Semester	: III	Credit	: 1
Category	: Discipline Specific Electives	Hours /Weeks	: 2
Class & Major	: II B.Sc physics	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Study about musical instruments and their vibration, frequency wavelength and intensity.
CO-2	Study about simple vibrating systems of musical instruments.
CO-3	Make the students understand the development of musical tons.
CO-4	Gain knowledge about productions of sounds.
CO-5	Understand the basic properties of vibration and frequency.

UNIT-I: SCIENTIFIC STUDY OF MUSIC 5 Hours

Vibrations of atoms of matter– vibrations coupling to air – propagation of sound waves in air, other media, fluids & solids – velocity, frequency, wavelength, time period, intensity

UNIT-II: SIMPLE VIBRATING SYSTEMS 5 Hours

Simple harmonic motion – tuning fork– amplitude, phase, energy, energy loss/damping/ dissipation – power – travelling waves and standing waves– laws of vibration in stretched strings

UNIT-III: MUSICAL TONES 5 Hours

Pure/simple tones – sine/cosine waves– well-defined frequencies, wavelengths, amplitudes & phases– partial tones – assembly of pure tones– mix of different frequencies & amplitudes.

UNIT-IV: PRODUCTION OF MUSICAL SOUNDS 6 Hours

Human voice, mechanism of vocal sound production – larynx (sound box) – *stringed Instruments*: plucked & bowed, guitar, mandolin, violin, piano, etc. – *wind instruments*: whistles, flute, saxophone, pipe organ, bag pipes, etc.,

UNIT-V: RECORDING OF MUSIC & SOUND 5 Hours

Edison phonograph – cylinder & disk records – magnetic wire and tape recorders – digital recording (e.g. to CD, DVD, etc.)– analog transducers, condenser, dynamic microphones, loudspeaker – complex sound fields – near & far fields of acoustic

TEXT BOOKS

- H. White, (2014), Physics and Music: The Science of Musical Sound.
- B. Parker, (2009), Good Vibrations – The Physics of Music.
- C. Sachs, (2006), The History of Musical Instruments.
- K. Tsuji and S. C. Müller, (2021), Physics and Music: Essential Connections and Illuminating Excursions

E-Resources

- https://books.google.com/books/about/Physics_and_Music.html?id=PXtpAwAAQBA
https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UIGkb-8Pr6svxWo-LA&start_radio=1&t=2472 <https://science.nasa.gov/ems/>

- https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UIGkb-8Pr6svxWo-LA&start_radio=1&t=2472
- https://books.google.com/books/about/Physics_and_Music.html?id=j9PuAAAAMAAJ

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Learn to differentiate between vibration and frequency, delve into intensity for the practical measurements of vibrating systems.	K1
CO – 2	Able to analyze the efficiency of simple vibrating systems.	K2
CO – 3	Apply the concepts about musical tones.	K3
CO – 4	Examine about the productions of sounds in musical instruments.	K4
CO – 5	Explain the auditory characteristics of tonal recordings and their diverse applications in human culture.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	2	2	3	3
CO-2	3	1	3	2	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	2	3	3	3	3

High Correlation- 73%

Medium Correlation- 17%

Low Correlation – 10%

OPTICS AND SPECTROSCOPY

UPHM408

Semester : IV
Category : Core IV
Class & Major : II B.Sc Physics

Credit : 3
Hours/Week : 5
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Explore the applications of lenses and prisms in optical devices such as eyepieces and spectrometers, and understand the resolving power of prisms, gratings, and telescopes.
CO-2	Study the applications of interferometers, such as Michelson's interferometer, in determining wavelengths, separation of spectral lines, and the thickness of materials.
CO-3	Understand the principles and applications of zone plates and the differences between zone plates and convex lenses.
CO-4	Acquire understanding of excitation and ionization potentials, spectral line splitting under magnetic and electric fields, and grasp the principles, production methods, and various applications of lasers.
CO-5	Study the properties, origins, and interpretation of IR spectra, including the bending and stretching vibrational modes of CH, CO, and CN.

UNIT-I: LENS AND PRISMS

14 Hours

Fermat's principle of least time – postulates of geometrical optics – thick and thin lenses – focal length, critical thickness, power and cardinal points of a thick lens – narrow angled prisms.

Lens: Lens Maker's formula (no derivation) – aberrations: spherical aberration, chromatic aberrations, coma, and astigmatism– curvature of the field – distortion – chromatic aberrations methods.

Prism: dispersion, deviation, aberrations - applications rainbows and halos, constant deviation spectroscope.

Eyepieces: Advantage of an eyepiece over a simple lens – Huygen's and Ramsden's eyepieces, construction and working –merits and demerits of the eyepiece.

Resolving power: Rayleigh's criterion for resolution – limit of resolution for the eye – resolving power of, (i) Prism (ii) grating (iii) telescope

UNIT-II: INTERFERENCE

12 Hours

Division of wave front, Fresnel's biprism – fringes with white light – division of amplitude: interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films applications – air wedge – Newton's rings.

Interferometers : Michelson's interferometer – applications, (i) determination of the wavelength of a monochromatic source of light, (ii) determination of the wavelength and separation D1 and D2 lines of sodium light, (iii) determination of a thickness of a mica sheet.

UNIT-III: DIFFRACTION

13 Hours

Fresnel's assumptions – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens –Fresnel type of diffraction – diffraction pattern due to a straight edge – positions of maximum and minimum intensities – diffraction due to a narrow slit – Fraunhofer type of diffraction – Fraunhofer diffraction at a single slit – plane diffraction grating– experiment to determine wavelengths – width of principal maxima.

UNIT-IV: POLARISATION

12 Hours

Optical activity – optically active crystals –polarizer and analyser–double refraction – optic axis, principal plane – Huygens's explanation of double refraction in uniaxial crystals – polaroids and applications – production and detection of circularly and elliptically polarized lights – Fresnel's explanation – specific rotation – Laurent half shade polarimeter – experiment to determine specific rotatory power.

UNIT-V: SPECTROSCOPY:

14 Hours

Infra-red spectroscopy near infra-red and far infra-red – properties –origin of IR spectra – IR spectrophotometer - **X- Ray diffraction analysis** – applications interpretation of IR spectra – CH, CO, CN bending and stretching vibrational modes only – scattering of light – Raman effect –**classical theory** –quantum theory –mutual exclusion principle – Raman spectrometer - characteristics of Raman lines –applications – **ultraviolet and visible spectroscopy –properties – spectrophotometer.**

TEXT BOOKS

- N. Subramaniam & Brijlal, 2014, Optics, 25th edition, S.Chand &Co.
- S. L. Gupta, V.Kumar & R.C.Sharma, 1997, Elements of Spectroscopy, 13th Edition, Pragati Prakashan, Meerut.
- G. Aruldhass, 2000, Molecular Structure and Spectroscopy II, edition. PHIPvt Ltd, New Delhi.
- P. R. Sasikumar, 2012, Photonics, PHI Pvt Ltd, New Delhi.
- K. Rajagopal, 2008, Engineering Physics, PHI Pvt Ltd, New Delhi.
- V. Rajendran, 2012, Engineering Physics, Tata McGraw Hill.

REFERENCE BOOKS

- B. S. Agarwal, 2011, Optics, Kedernath Ramnath Publishers, Meerut.
- C. N. Banewell, 2006, Introduction to Molecular Spectroscopy, 4th edition, TMH Publishing Co, New Delhi.
- Ghatak, 2009, Optics, 4th edition, PHIP vt Ltd, New Delhi.
- Singh & Agarwal, 2002, Optics and Atomic Physics, 9th edition, Pragati Prakashan Meerut.
- D. Halliday, R. Resnick and J. Walker, 2001, Fundamentals of Physics, 6th edition, Willey, New York.
- J. A. Francis & White, 2011, Fundamentals of Optics, 4th edition, McGraw Hill Inc., New Delhi.

E-Resources

- <https://science.nasa.gov/ems/>
- https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UIGkb-8Pr6svxWo-LA&start_radio=1&t=2472 <https://science.nasa.gov/ems/>
- https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCzwo7UIGkb-8Pr6svxWo-LA&start_radio=1&t=2472
- <https://imagine.gsfc.nasa.gov/educators/gammaraybursts/imagine/index.html>
- <http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/>
- <http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Retrieve fundamental of techniques for rectifying various defects in lenses, and elucidate the technological applications of eyepieces.	K1
CO-2	Gain an understanding of the principle of wave superposition, and apply these concepts to comprehend the wave nature of light by examining the functioning of an interferometer.	K2
CO-3	Utilize the mathematical principles to analyze optical instruments and the nature of light using diffraction techniques.	K3
CO-4	Analyze the fundamental concepts behind polarization and acquire understanding of polarimeters, evaluating their usage across various industries.	K4
CO-5	Explain the optical principles and their applications in fields such as IR, Raman, and UV spectroscopy, comprehending their instrumentation and industrial applications.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	2	3	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

High Correlation- 67%

Medium Correlation- 17%

Low Correlation – 16%

PRACTICALS-IV

LIGHT

UPHR406

Semester : IV

Credit : 2

Category : Core Practicals IV

Hours/Week : 3

Class & Major: II B.Sc Physics

Total Hours : 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Learn to determine the refractive index of prisms and liquids using spectrometers and hollow prisms.
CO-2	Explore the resolving power of gratings, telescopes, and diffraction gratings using lasers.
CO-3	Understand the precision and applications of laser-based measurements in modern optical experiments.
CO-4	Verify Newton's formula for lenses separated by a distance and understand the practical applications of this verification.
CO-5	Develop a comprehensive understanding of optical phenomena through hands-on experiments, equipping students with practical skills essential for advanced studies and research in optics and related fields.

Experimental

1. Determination of refractive index of prism using spectrometer.
2. Determination of refractive index of liquid using hollow prism and spectrometer
3. Determination of dispersive power of a prism.
4. Determination of radius of curvature of lens by forming Newton's rings.
5. Determination of thickness of a wire using air wedge.
6. Determination of Cauchy's Constants.
7. Determination of resolving power of grating
8. Determination of resolving power of telescope
9. Comparison of intensities using Lummer Brodhum Photometer.
10. Determination of range of motion using Searlesgoniometer.
11. Verification of Newton's formula for a lens separated by a distance.
12. Determination of refractive index of a given liquid by forming liquid lens

13. Determination of refractive index using Laser.
14. Determination of wavelengths, particle size using Laser/Monochromatic source.
15. Determination of resolving power of Diffraction grating using Laser
16. Determination of wire using Laser.

TEXT BOOKS

- H. S. Allen, 1938, Text Book of Light, Nature.
- Gupta Kumar and Pragati Prakasan, 2018, Practical Physics.

REFERENCE BOOKS

- F. A. Jenkins and H. E. White, 1981, Fundamentals of Optics, McGraw-Hill Education.
- E. Hecht, 2017, Optics, Practical Physics, Pearson.
- A. C. Melissinos and J. Napolitano, 2003, Experiments in Modern Physics, Academic Press.

E-Resources

- <https://www.nature.com/articles/141136a0>
- <https://www.ebookselibrary.com/book-detail/higher-education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-II-279>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Understand the refractive index of prism using spectrometer.	K1
CO – 2	Acquire knowledge of thickness of a wire using air wedge.	K2
CO – 3	Understand Newton's formula for a lens separated by a distance.	K2
CO – 4	Develop the knowledge about refractive index of a given liquid by forming liquid lens.	K3
CO – 5	Examine about the resolving power of a diffraction grating by employing laser technology.	K4

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3
CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77%

Medium Correlation- 07%

Low Correlation –16%

ENERGY PHYSICS

UPHD401

Semester : IV

Credit : 2

Category : Discipline

Hours/Week : 2

Class & Major : II B.Sc Physics

Total Hours : 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Develop a critical understanding of how energy consumption impacts global prosperity.
CO-2	Explore the principles of solar energy, including solar radiation geometry and measurement techniques.
CO-3	Understand the basics of properties, solar energy, wind energy, Biomass energy and their usages.
CO-4	Study biomass energy sources and conversion technologies, focusing on photosynthesis, fermentation, and biogas generation.
CO-5	Understand the classification and operation of biogas plants, wood gasification, and the environmental impacts associated with biomass energy.

UNIT-I: INTRODUCTION TO ENERGY SOURCES

5 Hours

Energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits

UNIT-II: SOLAR ENERGY

5 Hours

Solar energy Introduction – solar constant – solar radiation at the Earth's surface – solar radiation geometry – Solar radiation measurements – solar radiation data –solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells

UNIT-III: WIND ENERGY

5 Hours

Introduction –nature of the wind – basic principle of wind energy conversion – wind energy data and energy estimation – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy

UNIT-IV: BIOMASS ENERGY

5 Hours

Introduction – classification – biomass conversion technologies –photosynthesis – fermentation - biogas generation –classification of biogas plants – anaerobic digestion for biogas – wood gasification – advantages & disadvantages.

UNIT-V: ENERGY STORAGE

6 Hours

Importance of energy storage- batteries - lead acid battery -nickel-cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells - hydrogen storage

TEXT BOOKS:

- G. D. Rai, 2009, Non-Conventional Sources of Energy, Khanna Publishers, 4thEdn.
- S. P. Sukhstme, and J. K. Nayak, 2008, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 3rdEdn.
- D. P. Kothari, K P Singal and Rakesh Rajan, 2011, PHI Learning Pvt Ltd, 2nd Edn.

REFERENCE BOOKS

- John Twidell & Tony Weir, 2005, Renewable Energy Resources, Taylor & Francis, 2nd Edition.
- S. A. Abbasi and N. Abbasi, 2008, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd.
- M. P. Agarwal, 1982, Solar Energy, S. Chand & Co. Ltd., New Delhi.

E-Resources

- https://www.uobabylon.edu.iq/eprints/publication_4_10679_78.pdf
- <https://www.taylorfrancis.com/books/mono/10.4324/9780203478721/renewable-energy-resources-john-twidell-tony-weir>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Understand the various conventional energy sources in nature.	K1
CO – 2	Compare the significance of solar cookers, solar water heaters, and solar greenhouses, including different types of greenhouses and solar cells.	K2
CO – 3	Identify the advantages and disadvantages of WECS, applications – tidal energy.	K3
CO – 4	Functions about wood gasification and their applications in society.	K4
CO – 5	Apply batteries - lead acid battery -nickel-cadmium battery – fuel cells and their applications.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	2	2	1	3
CO-2	3	3	2	2	1	3
CO-3	3	3	3	3	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 70%

Medium Correlation- 13%

Low Correlation –17%

MATHEMATICAL PHYSICS

UPHD402

Semester : IV

Credit : 2

Category : Discipline

Hours/Week : 2

Class & Major : II B.Sc Physics

Total Hours : 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Gain the knowledge about different types of matrices including symmetric, Hermitian, unitary, and orthogonal matrices.
CO-2	Study fundamental vector identities and their applications in line, surface, and volume integrals.

CO-3	Gain proficiency in tangent basis vectors, scale factors, and unit vectors in cylindrical and spherical coordinate systems.
CO-4	Understand the theory and applications of Fourier series, including periodic functions, Dirichlet's conditions, and Fourier expansions of even and odd functions.
CO-5	Learn to solve these PDEs using the method of separation of variables, considering boundary and initial conditions.

UNIT-I: MATRICES

5 Hours

Types of matrices – symmetric, Hermitian, unitary and orthogonal matrices– characteristic equation of a matrix – Eigen values and Eigen vectors of a matrix – Cayley-Hamilton theorem – inverse of matrix by Cayley.

UNIT-II: VECTOR CALCULUS

5 Hours

Vector differentiation – directional derivatives – Laplace operators– vector identities – line, surface and volume integrals – statement, proof and simple problems for Gauss's divergence theorem, Stoke's theorem, and Green's theorem.

UNIT-III: ORTHOGONAL CURVILINEAR COORDINATES

5 Hours

Tangent basis vectors – scale factors – unit vectors in cylindrical and spherical coordinate systems –gradient of a scalar –divergence and curl of a vector – Laplacian in these coordinate systems

UNIT-IV: FOURIER SERIES

5 Hours

Periodic functions – Dirichlet's conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine – half range series – change of length of interval. Fourier analysis of square wave, saw-tooth wave, half wave/full wave rectifier wave forms.

Fourier Transforms: Fourier Integral theorem (Statement only)–Fourier, Fourier sine and Fourier cosine transforms,– Fourier transform of single pulse – trigonometric, exponential and Gaussian functions – inverse Fourier transform – convolution theorem.

UNIT-V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE)

6 Hours

PDE for transverse vibrations in elastic strings (one dimensional wave equation) –one dimensional heat flow equation – solutions to these PDE's by method of separation of variables – problems based on boundary conditions and initial conditions

TEXT BOOKS

- E. Kreyszig, 2008, Advanced Engineering Mathematics, Wiley India.
- P. K. Chattopadhyay, 1990, reprint 2004, Mathematical Physics –New Age International Publishers.
- B. D. Gupta. 2010, Mathematical Physics, Vikas, Publishing House Pvt., Ltd.,

REFERENCE BOOKS

- M.R. Spiegel, 2004, Fourier analysis Tata McGraw-Hill.

- B. R. Kusse & E. A. Westwig, 2006, Applied Mathematics for Scientists and Engineers, 2nd Edition, WILEY-VCH Verlag.
- J. C. Jain, 2001, Vector space & Matrices – Narosa Publishing House Pvt. Ltd.

E-Resources

- https://faculty.ksu.edu.sa/sites/default/files/fourier_series_1.pdf
- <https://usedbooks.net.in/index.php/product/engineering-mathematics-vol-ii-by-dr-m-k-venkataraman/>
- <https://onlinelibrary.wiley.com/doi/book/10.1002/9783527618132>
- https://books.google.co.in/books/about/Mathematical_Physics.html?id=uI7AQsNakJYC

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Understand the types of matrices, symmetric, Hermitian, unitary and orthogonal matrices.	K1
CO – 2	Relate the laplace operators– vector identities – line, surface and volume integrals.	K2
CO – 3	Identify the Laplacian in these coordinate systems for physics problem.	K3
CO – 4	Examine about the Exponential and Gaussian functions, the inverse Fourier transform, and the convolution theorem.	K4
CO – 5	Apply batteries problems based on boundary conditions and initial conditions	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	2	2	1	3
CO-2	3	3	2	2	1	3
CO-3	3	3	3	3	1	3
CO-4	3	3	3	3	1	3
CO-5	3	3	3	3	1	3

High Correlation- 70%

Medium Correlation- 13%

Low Correlation –17%

ALLIED PHYSICS – I UPHA301

Semester	: III	Credit	: 3
Category	: Allied I	Hours /Weeks	: 3
Class & Major	: II B.Sc Chemistry & Mathematics	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Study the basic properties and production of waves, oscillations and ultrasonic's by different methods.
CO-2	Make the students learn and understand the properties of materials and acoustics.

CO-3	The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales.
CO-4	Impart the basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.
CO-5	Innovate and design new experiments, systems, and applications to advance knowledge and technology in the field of physics.

UNIT-I: WAVES, OSCILLATIONS AND ULTRASONICS 8 Hours

Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasono imaging- ultrasonics in dentistry.

UNIT-II: PROPERTIES OF MATTER 8 Hours

Elasticity: elastic constants – bending of beam – theory of non- uniform bending – determination of Young’s modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum
 Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille’s formula – comparison of viscosities – burette method,
 Surface tension: definition – molecular theory – droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension.

UNIT-III: HEAT AND THERMODYNAMICS 8 Hours

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde’s process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot’s cycle – efficiency – entropy – change of entropy in reversible and irreversible process.

UNIT-IV: ELECTRICITY AND MAGNETISM 8 Hours

Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart’s law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.

UNIT-V: DIGITAL ELECTRONICS AND DIGITAL INDIA 7 Hours

logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification – overview of Government initiatives: software technological parks under Meit Y, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India.

TEXT BOOKS:

- R. Murugesan (2001), Allied Physics, S. Chand & Co, New Delhi.
- Brijlal and N. Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi.
- Brijlal and N.Subramaniam (1994), Properties of Matter, S.Chand & Co.,New

Delhi.

- J. B. Rajam and C. L. Arora (1976). Heat and Thermodynamics (8th Edition), S. Chand & Co., New Delhi.
- R. Murugesan (2005), Optics and Spectroscopy, S. Chand & Co, New Delhi.
- A. Subramaniam, Applied Electronics 2nd Edition, National Publishing Co., Chennai.

REFERENCEBOOKS

- R. Halliday and Walker (2018). Fundamentals of Physics (11th Edition), John Willey and Sons, Asia Pvt. Ltd., Singapore.
- V. R. Khanna and R. S. Bedi (1998), Text book of Sound 1st Edition, Kedharnaath Publish & Co, Meerut.
- N. S. Khare and, S. S. Srivastava (1983), Electricity and Magnetism 10th Edition, Atma Ram & Sons, New Delhi.
- D. R. Khanna and H. R. Gulati (1979). Optics, S. Chand &Co. Ltd., New Delhi.
- V. K. Metha (2004). Principles of electronics 6th Edition, S. Chand and Company.

E-Resources

- https://youtu.be/M_5KYncYNyc
- <https://youtu.be/ljJLJgIvaHY>
- https://youtu.be/7mGqd9HQ_AU
- <https://youtu.be/h5jOAw57OXM>
- <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
- <http://hyperphysics.phyastr.gsu.edu/hbase/permot2.html>
- https://youtu.be/7mGqd9HQ_AU

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Acquire knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.	K1
CO-2	Understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.	K2
CO-3	Develop the basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.	K3
CO-4	Functions related to electric current resistance and capacitance functions in relation to the potential electric field, understanding the correlation between electric and magnetic fields enables the mathematical verification of circuits.	K4
CO-5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	2	2	3	3

CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

High Correlation- 63%

Medium Correlation- 20%

Low Correlation – 17%

**ALLIED PRACTICALS – I
UPHR302/UPHR303**

Semester	: III	Credit	: 2
Category	: Allied I	Hours /Weeks	: 2
Class & Major	: II B.Sc Chemistry & Mathematics	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand and measure the Young's modulus through non-uniform bending using different methods, such as the pin and microscope technique and the optic lever method.
CO-2	Investigate the surface tension and interfacial surface tension using the drop weight method.
CO-3	Develop skills to determine the specific heat capacity of liquids, including applying corrections like the half-time correction method.
CO-4	Understand and verify the truth tables of basic logic gates using ICs, apply De Morgan's theorems, and explore the use of NAND gates as universal building blocks for digital circuits.
CO-5	Study the laws of transverse vibrations using a Sonometer, gaining practical understanding of wave mechanics and resonant frequencies.

Experimental

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
2. Surface tension and interfacial Surface tension – drop weight method
3. Comparison of viscosities of two liquids – burette method
4. Specific heat capacity of a liquid – half time correction
5. Verification of laws of transverse vibrations using Sonometer
6. Calibration of low range voltmeter using potentiometer
7. Determination of thermo emf using potentiometer
8. Verification of truth tables of basic logic gates using ICs
9. Verification of De Morgan's theorems using logic gate ICs.
10. Use of NAND as universal building block.

TEXT BOOKS

- Gupta Kumar and Pragati Prakasan, 2018, Practical Physics.
- R. Srinivasan and K. R. Priolkar, 2018, Kit Developed for doing experiments in Physics- Instruction manual, Indian Academy of Sciences.

REFERENCE BOOKS

- S. P. Singh, Pragati Prakasan, 2017, Advanced Practical Physics.
- D. Chattopadhyay and C.R Rakshit, 2012, An advanced course in Practical Physics, New Central Book Agency Pvt. Ltd.,

E-Resources

- [https://www.ebookselibrary.com/book-detail/higher education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278](https://www.ebookselibrary.com/book-detail/higher%20education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278)
- <https://narasinhaduttcollege.edu.in/ws/wp-content/uploads/2016/05/Physics-14-11-19.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO – 1	Understand the strength of material using Young's modulus.	K1
CO – 2	Acquire knowledge of thermal behavior of the materials.	K2
CO – 3	Identify the theoretical principles of magnetism through the experiments.	K3
CO – 4	Functions about arc spectrum and applications of laser.	K4
CO – 5	Explain the analytical and observation ability in Physics Experiments	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3
CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77%

Medium Correlation- 6%

Low Correlation –17%

ALLIED PHYSICS – II UPHA401

Semester : IV

Category : Allied II

Class & Major : II B.Sc Chemistry & Mathematics

Credit : 2

Hours /Weeks : 3

Total Hours : 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.
CO-2	Explore phenomena like the photoelectric effect and its applications in solar cells and optoelectric devices.
CO-3	Learn about nuclear models such as the liquid drop model and shell model, and understand concepts like mass defect and binding energy.
CO-4	Impart the basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

UNIT-I: OPTICS**8 Hours**

Interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries.

UNIT-II: ATOMIC PHYSICS**8 Hours**

Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect – Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels, photoelectric devices.

UNIT-III: NUCLEAR PHYSICS**8 Hours**

Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods – introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.

UNIT-IV: INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**8 Hours**

Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence – introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.

UNIT-V: SEMICONDUCTOR PHYSICS**7 Hours**

p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger – introduction to e-vehicles and EV charging stations.

TEXT BOOKS:

- R. Murugesan (2005), Allied Physics, S. Chand & Co, New Delhi.
- K.Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
- Brijlal and N. Subramanyam (2002), Text book of Optics, S. Chand & Co, New Delhi.
- R. Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi.
- A. Subramanyam Applied Electronics, 2nd Edition, National Publishing Co., Chennai.

REFERENCEBOOKS

- R. Halliday and Walker (2018), Fundamentals of Physics, 11th Edition, John

Wiley and Sons, Asia Pvt. Ltd., Singapore.

- D. R. Khanna and H. R. Gulati (1979). Optics, S. Chand & Co. Ltd., New Delhi.
- A. Beiser (1997), Concepts of Modern Physics, Tata McGraw Hill Publication, New Delhi.
- Thomas L. Floyd (2017), Digital Fundamentals, 11th Edition, Universal Book Stall, New Delhi.
- V. K. Metha (2004), Principles of electronics, 6th Edition, S. Chand and Company, New Delhi.

E-Resources

- https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
- <https://www.youtube.com/watch?v=JrRrp5F-Qu4>
- <https://www.validyne.com/blog/leak-test-using-pressure-transducers/>
- <https://www.atoptics.co.uk/atoptics/blsky.htm> -
- <https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Gain knowledge of interference and diffraction by applying the principles of wave superposition. Additionally, rephrase the concept of polarization by examining wave patterns.	K1
CO-2	Outline the fundamental principles of different atom models and various experiments that establish quantum concepts. Emphasize the importance of interpreting and improving theoretical models based on observation. Appreciate the interdisciplinary nature of science, particularly in solar energy-related applications	K2
CO-3	Identify the properties of nuclei, nuclear forces, the structure of atomic nuclei, and nuclear models. Solve problems related to decay rate, half-life, and mean-life.	K3
CO-4	Compare the basic concepts of relativity, such as the equivalence principle, inertial frames, and Lorentz transformations. Extend understanding to other related concepts in relativity and vice versa	K4
CO-5	Explain the functioning of semiconductor devices such as junction diodes, Zener diodes, and transistors. Additionally, explore the practical application of these devices in everyday items like USB chargers and electric vehicle (EV) charging stations.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	2	2	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

High Correlation- 63%

Medium Correlation- 20%

Low Correlation – 17%

ALLIED PRACTICALS – II
UPHR402/UPHR403

Semester	: IV	Credit	: 2
Category	: Allied II	Hours /Weeks	: 3
Class & Major	: II B.Sc Chemistry & Mathematics	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Learn to determine the radius of curvature of a lens using Newton's rings and measure the thickness of a wire using the air wedge method.
CO-2	Characterize Zener diodes and construct Zener/IC regulated power supplies for practical electronic applications.
CO-3	Measure the frequency of alternating current (AC) using a Sonometer, enhancing understanding of acoustic properties and wave mechanics.
CO-4	Develop skills in constructing basic logic gates (AND, OR, NOT) using diodes and transistors, and explore the use of NOR gates as universal building blocks.
CO-5	Develop a comprehensive understanding of both theoretical principles and practical laboratory skills, essential for advanced studies and research in physics and engineering.

Experimental

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using Sonometer
7. Specific resistance of a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterization of Zener diode
12. Construction of Zener/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor
14. NOR gate as a universal building block

TEXT BOOKS

- Gupta Kumar and Pragati Prakasan, 2018, Practical Physics.
- R. Srinivasan and K. R. Priolkar, 2018, Kit Developed for doing experiments in Physics- Instruction manual, Indian Academy of Sciences.

REFERENCE BOOKS

- S. P. Singh, Pragati Prakasan, 2017, Advanced Practical Physics.
- D. Chattopadhyay and C.R Rakshit, 2012, An advanced course in Practical Physics, New Central Book Agency Pvt. Ltd.,

E-Resources

- <https://www.ebookselibrary.com/book-detail/higher-education/physics/ADVANCED-PRACTICAL-PHYSICS-Vol.-I-278>
- <https://narasinhaduttcollege.edu.in/ws/wp-content/uploads/2016/05/Physics-14-11-19.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO1	Understand the strength of material using Newton's rings.	K1
CO2	Acquire knowledge of AC frequency using Sonometer.	K2
CO3	Construct the theoretical principles of wire using PO box.	K3
CO4	Functions of a Zener diode and its electrical applications in electronic circuits.	K4
CO5	Justify the analytical and observation ability in universal building block.	K5

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	3	1	3	2
CO-2	3	3	3	1	3	2
CO-3	3	3	3	1	3	3
CO-4	3	3	3	1	3	3
CO-5	3	3	3	1	3	3

High Correlation- 77%

Medium Correlation- 6%

Low Correlation –17%

III and IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core Courses	UPHM510	Atomic Physics and Lasers	Assignment	Seminar
	Core Courses	UPHM511	Relativity and Quantum Mechanics	Seminar	Assignment
	Core Elective	UPHO503	Materials Science	Assignment	Poster Presentation
	Core Elective	UPHO504	Lasers and Fiber optics	Seminar	Seminar
IV	Core Courses	UPHM612	Nuclear and Particle Physics	Chart Preparation	Poster Presentation
	Core Courses	UPHM614	Solid State Physics	Assignment	Seminar
	Core Elective	UPHO605	Digital Electronics and Microprocessor 8085	Seminar	Seminar
	Core Elective	UPHO606	Numerical Methods and C Programming	Seminar	Problem Solving

PG & RESEARCH DEPARTMENT OF PHYSICS

PREAMBLE:

PG: Programme profile & the syllabi of courses offered in semester III and IV along with III and IV evaluation components (with effect from 2023 – 2025 batch onwards).

PROGRAM SPECIFIC OUTCOME (PSO)

PSO	On completion of this programme, students will be able to
PSO 1:	Articulate fundamental and advance concepts, principles and processes underlying physical phenomena in different branches of physical sciences.
PSO 2:	Perform the calculations in theoretical physics using qualitative and quantitative reasoning including sophisticated mathematical techniques.
PSO 3:	Comprehend, design and construct electronic circuits, Develop the experimental and data analysis skills through a wide range of lab experiments.
PSO 4:	Analyze and interpret data collected using appropriate methods, including the use of suitable software and customized worksheets, and relating the conclusions to relevant theories of physics.
PSO 5:	Conduct independent study to discover and review research articles, select a research topic, strategize, execute and report findings for research projects.
PSO 6:	Evaluate the role of Physics in enhancing the life of the people and involve in community building activities

PROGRAMME PROFILE M. Sc. Physics

Sem	Part	Category	Course Code	Course Title	Contact Hrs/Week	Credits
I	I	Core Course-I	PPHM107	Mathematical Physics	5	4
		Core Course-II	PPHM108	Classical Mechanics and Relativity	5	4
		Core Practical-I	PPHR102	Practical I	5	4
	II	Elective Course (Generic / Discipline Centric)-I	PPHO101	Energy Physics	5	3
		Elective Course (Generic / Discipline Centric)-II	PPHO102	Linear and Digital ICs and Applications	5	3
	III	Skill Enhancement Course (NME)	--	--	3	2
	IV	Online Course	--	--	2	2
Total					30	22
II	I	Core Course-III	PPHM208	Statistical Mechanics	5	4
		Core Course-IV	PPHM209	Quantum Mechanics –I	5	4
		Core Practical-II	PPHR204	Practical – II	5	4
	II	Elective Course (Generic / Discipline	PPHO201	Non-Linear Dynamics	4	3

		Centric)-III				
		Elective Course (Generic / Discipline Centric)-IV	PPHO202	Solid Waste Management	4	3
	III	Core Industry Module - I	PPHM210	Sewage And Waste Water Treatment And Reuse	4	3
	IV	Skill Enhancement Course –DSE II	PPHD201	Electronics Communication System	3	2
	V	Service Learning (outside class hours)	PPXI201	Energy Audit	--	1
		Internship/Industri al activity/Field visit	PINS201	---	--	2
	Total				30	26

		Core - V	PPHM308	Quantum Mechanics –II	5	4
	I	Core-VI	PPHM309	Condensed Matter Physics	5	4
		Core Practical-III	PPHR304	Practical – III Numerical Methods and Computer Programming (FOTRAN/C)	5	4
		Core Elective-V	PPHO301	Electromagnetic Theory	3	3
	II	Core Elective-VI	PPHO302	Physics of Nano Science And Technology	4	3
		Core Industry Module -II	PPHM310	Medical Physics	4	3
	IV	Skill Enhancement Course /Interdisciplinary III	PPHD301	Characterization of Materials	4	2
	Total				30	23
	IV	Core-VII	PPHM406	Nuclear and Particle Physics	5	4
		Core-VIII	PPHM407	Spectroscopy	5	4
		Core-IX	PPHM408	Numerical Methods and Computer Programming	5	4
		Core Project	PPHP402	Project with Viva-Voce	6	4
		Core Elective-VII	PPHO401	Communication Electronics	5	3
		Skill Enhancement Course – Professional Competency Skill - IV	PPHD401	Solar Energy Utilization	4	2
		IV	Internship	--	--	--
	TOTAL				30	23
	GRAND TOTAL				120	94

QUANTUM MECHANICS –II PPHM308

Semester	: III	Credit	: 4
Category	: Core VIII	Hours /Weeks	: 5
Class & Major	: II M.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Formal development of the theory and the properties of angular momenta, both orbital and spin.
CO-2	Familiarize the students to the crucial concepts of scattering theory such as partial wave analysis and Born approximation.
CO-3	Time-dependent Perturbation theory and its application to study of interaction of an

	atom with the electromagnetic field.
CO-4	Will learn about a firm grounding in relativistic quantum mechanics, with emphasis on Dirac equation and related concepts.
CO-5	Introduce the concept of covariance and the use of Feynman graphs for depicting different interactions.

UNIT I: SCATTERING THEORY

14 Hours

Scattering theory – scattering of a particle by affixed centre of force - Scattering amplitude – Cross sections – Born approximation and its validity – Integral equation for potential scattering – Green’s function–Scattering by a screened coulomb potential – Yukawa potential – Partial wave analysis – Scattering length and Effective range theory for s wave – Optical theorem – Transformation from centre of mass to laboratory frame

UNIT II: PERTURBATION THEORY

13 Hours

Time dependent perturbation theory – Constant and harmonic perturbations – Fermi Golden rule – Transition probability Einstein’s A and B Coefficients – Adiabatic approximation – Sudden approximation – Semi – classical treatment of an atom with electromagnetic radiation – Selection rules for dipole radiation

UNIT III: RELATIVISTIC QUANTUM MECHANICS

12 Hours

Klein – Gordon Equation – Charge and Current Densities – Dirac Matrices – Dirac Equation – Plane Wave Solutions – Interpretation of Negative Energy States – Antiparticles – Spin of Electron – Magnetic Moment of an Electron Due To Spin

UNIT IV: DIRAC EQUATION

12 Hours

Covariant form of Dirac Equation – Properties of the gamma matrices – Traces – Relativistic invariance of Dirac equation – Probability Density – Current four vector – Bilinear covariant – Feynman’s theory of positron (Elementary ideas only without propagation formalism).

UNIT V: CLASSICAL FIELDS AND SECOND QUANTIZATION

14 Hours

Classical fields – Euler Lagrange equation – Hamiltonian formulation – Noether’s theorem – Quantization of real and complex scalar fields – Creation, Annihilation and Number operators – Fock states – Second Quantization of K-G field.

TEXT BOOKS

- P. M. Mathews and K. Venkatesan, 2010, A Text book of Quantum Mechanics, 2nd Edition, Tata McGraw-Hill, New Delhi.
- G. Aruldhas, 2009, Quantum Mechanics, 2nd Edition, Prentice-Hall of India, New Delhi.
- L. I. Schiff, 1996, Quantum Mechanics, 3rd Edition, International Student Edition, McGraw-Hill Kogakusha, Tokyo.
- V. Devanathan, 2005, Quantum Mechanics, 1st Edition, Narosa Publishing House, New Delhi.
- Nouredine Zettili, 2017, Quantum mechanics concepts and applications, 2nd Edition, Wiley.

REFERENCE BOOKS

- V. Devanathan, 2005, Quantum Mechanics, Narosa Publishing House, New Delhi.
- B. K. Agarwal & Hari Prakash, 2009, Quantum Mechanics, 7th reprint, PHI Learning Pvt. Ltd., New Delhi.

- Deep Chandra Joshi, 2006, Quantum Electrodynamics and Particle Physics, 1st Edition, I. K. International Publishing house Pvt. Ltd.,
- Ghatak and S. Lokanathan, Quantum Mechanics: Theory and Applications, 4th Edition, Macmillan India, New Delhi.
- J. S. Bell, Gottfried and M. Veltman, 2001, the Foundations of Quantum Mechanics, World Scientific.

E- Resources

- https://ocw.mit.edu/courses/physics/8-05-quantum-physics-ii-fall-2013/lecture-notes/MIT8_05F13_Chap_09.pdf
- http://www.thphys.nuim.ie/Notes/MP463/MP463_Ch1.pdf
- <http://hep.itp.tuwien.ac.at/~kreuzer/qt08.pdf>
- <https://www.cmi.ac.in/~govind/teaching/rel-qm-rc13/rel-qm-notes-gk.pdf>
- <https://web.mit.edu/dikaiser/www/FdsAmSci.pdf>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the concepts of quantum mechanics for real-world microscopic problems, such as scattering and atomic structure.	K1/K2
CO-2	Identify the transition probabilities and establish selection rules for spectral transitions in various types of time-dependent perturbations.	K3
CO-3	Analyze relativistic quantum mechanical equations, namely the Klein-Gordon and Dirac equations.	K4
CO-4	Importance of Dirac equation for a free particle and particle in a central potential.	K5
CO-5	Improve the field quantization and provide a more comprehensive explanation of the scattering matrix.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	1	2	2
CO-2	3	3	1	1	3	3
CO-3	3	3	1	2	3	3
CO-4	3	3	1	2	3	3
CO-5	3	3	2	2	3	3

Higher Correlation- 60%

Medium Correlation- 20%

Lower Correlation –20%

CONDENSED MATTER PHYSICS
PPHM309

Semester	: III	Credit	: 4
Category	: Core XI	Hours /Weeks	: 5
Class & Major	: II M.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Describe various crystal structures, symmetry and to differentiate different types of bonding.
CO-2	Construct the reciprocal space, to understand the lattice dynamics and apply it to concept of specific heat.
CO-3	Critically assess the various theories of electrons in solids and their impact in distinguishing solids.
CO-4	Outline different types of magnetic materials and explain the underlying phenomena.
CO-5	Elucidation of concepts of superconductivity, the underlying theories – relate to current areas of research.

UNIT I: CRYSTAL PHYSICS

13 Hours

Types of lattices - Miller indices – Symmetry elements and allowed rotations - Simple crystal structures – Atomic Packing Factor- Crystal diffraction - Bragg's law – Scattered Wave Amplitude - Reciprocal Lattice (sc, bcc, fcc). Structure and properties of liquid crystals. Diffraction Conditions - Laue equations - Brillouin zone - Structure factor - Atomic form factor - Inert gas crystals - Cohesive energy of ionic crystals - Madelung constant - Types of crystal binding (general ideas).

UNIT II: LATTICE DYNAMICS

13 Hours

Vibration of monoatomic lattices – lattices with two atoms per primitive cell - Lattice with two atoms per primitive cell - First Brillouin zone - Group and phase velocities - Quantization of lattice vibrations - Phonon momentum - Inelastic scattering by phonons - Debye's theory of lattice heat capacity - Thermal Conductivity - Umklapp processes.

UNIT III: THEORY OF METALS AND SEMICONDUCTORS

13 Hours

Free electron gas in three dimensions - Electronic heat capacity - Wiedemann-Franz law - Band theory of metals and semiconductors - Bloch theorem - Kronig-Penney model - Semiconductors - Intrinsic carrier concentration – Temperature Dependence - Mobility - Impurity conductivity – Impurity states - Hall effect - Fermi surfaces and construction - Experimental methods in Fermi surface studies - de Hass-van Alphen effect.

UNIT IV: MAGNETISM

13 Hours

Terms and definitions used in magnetism - Classification of magnetic materials - Diamagnetism - Quantum theory of paramagnetism - Rare earth ion - Hund's rule - Quenching of orbital angular momentum - Adiabatic demagnetization - Quantum theory of ferromagnetism - Curie point - Exchange integral - Heisenberg's interpretation of Weiss field - Ferromagnetic domains - Bloch wall - Spin waves - Quantization - Magnons - Thermal excitation of magnons - Curie temperature and susceptibility of ferrimagnets - Theory of antiferromagnetism - Neel temperature.

UNIT V: SUPERCONDUCTIVITY**13 hours**

Experimental facts: Occurrence - Effect of magnetic fields - Meissner effect – Critical field – Critical current - Entropy and heat capacity - Energy gap - Microwave and infrared properties - Type I and II Superconductors.

Theoretical Explanation: Thermodynamics of super conducting transition - London equation - Coherence length – Isotope effect - Cooper pairs – Bardeen Cooper Schrieffer (BCS) Theory – BCS to Bose – Einstein Condensation (BEC) regime- Nature of pairing and condensation of Fermions. Single particle tunneling – Josephson tunneling - DC and AC Josephson effects - High temperature Superconductors – SQUIDS.

TEXT BOOKS

- Yu. L.S Iroin, M.P. Shaskolskaya, 1983, Fundamental of Crystal Physics, Mir Publics Moscow.
- C. Kittel, 2008, Introduction to Solid State Physics, Wiley Eastern, New Delhi.
- M. M. Woolfson, 1970, an Introduction to X-ray Crystallography, Cambridge University Press, Cambridge.
- S. O. Pillai, 2007, Solid State Physics, New Age International, New Delhi.

REFERENCE BOOKS

- J. S. Blakemore, 1974, *Solid state Physics*, 2nd Edition, W.B. Saunder, Philadelphia.
- H. M. Rosenburg, 1993, *the Solid State Physics*, 3rd Edition, Oxford University Press, Oxford.
- J. M. Ziman, 1971, *Principles of the Theory of Solids*, Cambridge University Press, London.
- C. Ross-Innes and E. H. Rhoderick, 1976, *Introduction to Superconductivity*, Pergamon, Oxford.
- J. P. Srivastava, 2001, *Elements of Solid State Physics*, Prentice-Hall of India, New Delhi.

E- Resources

- <http://www.physics.uiuc.edu/research/electronicstructure/389/389-cal.html>
- <http://www.cmp.ucl.ac.uk/%7Eaph/Teaching/3C25/index.html>
- <https://www.britannica.com/science/crystal>
- <https://www.nationalgeographic.org/encyclopedia/magnetism/>
- https://www.brainkart.com/article/Super-Conductors_6824/

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Compare the different types of crystal structure in terms of the crystal lattice and the basis of constituent atoms.	K1/K2
CO-2	Make use of Lattice Vibrations in solids to measure the electrical and thermal conductivity of metals.	K3
CO-3	Distinguish between the Dielectric and Magnetic Properties of the materials.	K4
CO-4	Supporting the development of a novel material is grounded in a crucial comprehension of its properties.	K5
CO-5	Advanced development of the occurrence of superconductivity, properties, types, and applications of superconductors.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	2	3	2
CO-2	3	3	1	2	3	2
CO-3	3	3	1	3	3	3
CO-4	3	3	1	2	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 67% Medium Correlation- 16% Lower Correlation – 17%

PRACTICAL – III

NUMERICAL METHODS AND COMPUTER PROGRAMMING (FORTRAN/C) PPHR304

Semester	: III	Credit	: 4
Category	: Core XI	Hours /Weeks	: 5
Class & Major	: II M.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the Lagrange interpolation method, including its algorithm, flow chart representation, and how it computes the interpolated values based on given data points.
CO-2	Study the least squares fitting method for curve fitting, including its algorithm, flow chart, and how it minimizes the sum of the squares of the differences between observed and predicted values.
CO-3	Apply software tools to investigate concepts in physical science.
CO-4	Approach the real time activities using physics and mathematical formulations.
CO-5	Solve various numerical limit problems using C or FORTRAN Programme.

Course Details

1. Lagrange interpolation with Algorithm, Flow chart and output.
2. Newton forward interpolation with Algorithm, Flow chart and output.
3. Newton backward interpolation with Algorithm, Flow chart and output.
4. Curve-fitting: Least squares fitting with Algorithm, Flow chart and output.
5. Numerical integration by the trapezoidal rule with Algorithm, Flow chart and output.
6. Numerical integration by Simpson's rule with Algorithm, Flow chart and output.
7. Numerical solution of ordinary first-order differential equations by the Euler method with Algorithm, Flow chart and output.
8. Numerical solution of ordinary first-order differential equations by the Runge- Kutta method with Algorithm, Flow chart and output.
9. Runge Kutta Fourth Order Method for solving first order Ordinary Differential Equations

10. Newton's cotes formula
11. Trapezoidal rule
12. Simpson's 1/3 rule
13. Simpson's 3/8 rule
14. Boole's rule
15. Gaussian quadrature method (2 point and 3 point formula)
16. Giraffe's root square method for solving algebraic equation

TEXT BOOKS

- J. Mathews and K. Fink, 2006, Numerical methods using Matlab, Prentice Hall, New Jersey.
- M. K. Venkataraman, 1996, Numerical methods in Science and Engineering, National Publishing Co. Madras.
- V. Rajaraman, 1993, Computer Oriented Numerical Methods, 3rd Edition. (Prentice-Hall, New Delhi.
- M. K. Jain, S.R. Iyengar and R. K. Jain, 1995, Numerical Methods for Scientific and Engineering Computation, 3rd Edition. New Age International, New Delhi.
- S. S. Sastry, Introductory Methods of Numerical Analysis, PHI, New Delhi.

REFERENCE BOOKS

- S. D. Conte and C. de Boor, 1981, Elementary Numerical Analysis, An Algorithmic Approach, 3rd Edition, International Ed. (McGraw-Hill).
- B. F. Gerald and P. O. Wheatley, 1994, Applied Numerical Analysis, 5th Edition, Addison Wesley, Reading, MA.
- B. Carnahan, H.A. Luther and J. O. Wikes, 1969, Applied Numerical Methods Wiley, New York.
- S. S. Kuo, 1996, Numerical Methods and Computers, Addison - Wesley, London.
- V. Rajaraman, Programming in FORTRAN/ Programming in C, PHI, New Delhi.

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Understand and apply numerical methods to find out solution of algebraic equation using different methods under different conditions, and numerical solution of system of algebraic equations using C / FORTRANProgram.	K1/K2
CO-2	Develop the knowledge about various C programs and applying the numerical methods problems.	K3
CO-3	Test for the problem-solving aptitudes of students using various numerical methods.	K4
CO-4	Identify modern programming methods and describe the extent and limitations of computational methods in physics.	K5
CO-5	Solve problem, critical thinking and analytical reasoning as applied to scientific problems.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	3	2	2
CO-2	3	3	1	3	3	3
CO-3	3	3	1	3	3	3
CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 77% Medium Correlation- 17% Lower Correlation –06%

ELECTROMAGNETIC THEORY PPHO301

Semester	: III	Credit	: 3
Category	: Core X	Hours /Weeks	: 3
Class & Major	: II M.Sc Physics	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Acquire knowledge about boundary conditions between two media and the technique of method of separation of variables.
CO-2	Understand the Biot – Savart’s law and Ampere’s circuital law.
CO-3	Understand the physical concepts conveyed in Maxwell’s equations, Coulomb and Lorentz gauges, and conservation laws.
CO-4	Assimilate the concepts of electromagnetic wave propagation, polarization, reflection, and refraction.
CO-5	Comprehend the concept of plasma as the fourth state of matter.

UNIT I: ELECTROSTATICS

8 Hours

Coloumb’s law – Electric field - Boundary value problems and Laplace equation – Boundary conditions and uniqueness theorem – Laplace equation in three dimension – Solution in Cartesian and spherical polar coordinates – Examples of solutions for boundary value problems. Polarization and displacement vectors - Boundary conditions - Dielectric sphere in a uniform field – Molecular polarizability and electrical susceptibility – Electrostatic energy in the presence of dielectric – Multipole expansion.

UNIT II: MAGNETOSTATICS

7 Hours

Biot-Savart’s Law - Ampere's law - Magnetic vector potential and magnetic field of a localized current distribution - Magnetic moment, force and torque on a current distribution in an external field - Magneto static energy - Magnetic induction and magnetic field in macroscopic media - Boundary conditions - Uniformly magnetized sphere

UNIT III: MAXWELL EQUATIONS

8 Hours

Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations - Vector and scalar potentials - Gauge invariance - Wave equation and plane wave solution- Coulomb and Lorentz gauges - Energy and momentum of the field - Poynting's theorem - Lorentz force - Conservation laws for a system of charges and electromagnetic fields

UNIT IV: WAVE PROPAGATION**8 Hours**

Electromagnetic waves in free space – Plane waves in non-conducting media - Linear and circular polarization, reflection and refraction at a plane interface - Waves in a conducting medium - Propagation of waves in a rectangular wave guide.

Inhomogeneous wave equation and retarded potentials - Radiation from a localized source - Oscillating electric dipole

UNIT V: ELEMENTARY PLASMA PHYSICS**8 Hours**

Plasma – Plasma criteria – Plasma oscillations - The Boltzmann Equation - Simplified magneto-hydrodynamic equations - Electron plasma oscillations - The Debye shielding problem - Plasma confinement in a magnetic field - Magneto-hydrodynamic waves - Alfvén waves and magnetosonic waves

TEXT BOOKS

- D. J. Griffiths, 2002, *Introduction to Electrodynamics*, 3rd Edition, Prentice-Hall of India, New Delhi.
- Satyaprakash, 2010, *Electromagnetic theory and Electrodynamics*, Meerut, KedarNath Ram.
- D. J. Griffiths 2012, *Introduction to Electrodynamics*, New Delhi, Addison Wesley.
- Uma Mukherji, 2006, *Electromagnetic field Theory and Wave Propagation*, New Delhi, Narosa publishing House, New Delhi.

REFERENCE BOOKS

- B. Chakraborty, 2002, *Principles of Electrodynamics*, Books and Allied, Kolkata.
- P. Feynman, R. B. Leighton and M. Sands, 1998, *the Feynman Lectures on Physics*, Vols. 2, Narosa Publishing House, New Delhi.
- Andrew Zangwill, 2013, *Modern Electrodynamics*, Cambridge University Press, USA.
- G. C. Agarwal, K. K. Chopra, 2010, *Electromagnetic Theory*, K Nath & Co.,.
- E. C. Jordan, K. G. Balmain, 2005, *Electromagnetic waves and Radiating systems*, Prentice Hall of India.
- R. Reitz John, 2009, *Foundations of Electromagnetic Theory*, Pearson Education India, New Delhi.

E – Resources

- <http://www.plasma.uu.se/CED/Book/index.html>
- <http://www.thphys.nuim.ie/Notes/electromag/frame-notes.html>
- <http://www.thphys.nuim.ie/Notes/em-topics/em-topics.html>
- http://dmoz.org/Science/Physics/Electromagnetism/Courses_and_Tutorials/
- <https://www.cliffsnotes.com/study-guides/physics/electricity-and-magnetism/electrostatics>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the fundamental concepts of electrostatics, magnetostatics, and field equations.	K1/K2
CO-2	Identify the boundary condition in magnetostatics.	K3

CO-3	Construct Maxwell's equations and identify each mathematical operator and physical quantity in the equations.	K4
CO-4	Determine the Magnetic dipole radiation relation and electromagnetic wave propagation in plasma medium.	K5
CO-5	Adapt and solve classic image problem, electromagnetic waves in different medium, Debye shielding problem and Dispersion relation in plasma.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	1	2	2	2
CO-2	3	2	1	2	3	3
CO-3	3	3	1	3	3	3
CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 63% Medium Correlation- 17% Lower Correlation –20%

PHYSICS OF NANO SCIENCE AND TECHNOLOGY PPHO302

Semester	: III	Credit	: 3
Category	: Core Elective IV	Hours /Weeks	: 4
Class & Major	: II M.Sc Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Physics of Nanoscience and Technology is concerned with the study, creation, manipulation and applications at nanometer scale.
CO-2	Offer fundamental insights into nanoscience and technology.
CO-3	Learn the structures and properties of nanomaterials.
CO-4	Acquire the knowledge about synthesis methods and characterization techniques and its applications.
CO-5	Be aware of the application of nano systems.

UNIT I: FUNDAMENTALS OF NANOSCIENCE AND TECHNOLOGY 10 Hours

Fundamentals of NANO – Historical Perspective on Nanomaterial and Nanotechnology – Classification of Nanomaterials – Metal and Semiconductor Nanomaterials - 2D, 1D, 0D nanostructured materials - Quantum dots – Quantum wires – Quantum wells - Surface effects of nanomaterials

UNIT II: PROPERTIES OF NANOMATERIALS 11 Hours

Physical properties of Nanomaterials: Melting points, specific heat capacity, and lattice constant - Mechanical behavior: Elastic properties – strength - ductility - superplastic behavior - Optical properties: - Surface Plasmon Resonance – Quantum size effects - Electrical properties - Conductivity, Ferroelectrics and dielectrics - Magnetic properties – super para magnetism – Diluted magnetic semiconductor (DMS).

UNIT III: SYNTHESIS AND FABRICATION**10 Hours**

Physical vapour deposition - Chemical vapour deposition - sol-gel – Wet deposition techniques - electrochemical deposition method – Plasma arching - Electrospinning method - ball milling technique - pulsed laser deposition - Nanolithography: photolithography – Nanomanipulator

UNIT IV: CHARACTERIZATION TECHNIQUES**10 Hours**

Powder X-ray diffraction – X-ray photoelectron spectroscopy (XPS) - UV-visible spectroscopy – Photoluminescence - Scanning electron microscopy (SEM) - Transmission electron microscopy (TEM) - Scanning probe microscopy (SPM) - Scanning tunneling microscopy (STM) – Vibrating sample Magnetometer

UNIT V: APPLICATIONS OF NANOMATERIALS**11 Hours**

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- H. Gao, 2004, Nanostructures and Nanomaterials, Imperial College Press.
- R. Booker and E. Boysen, 2005, Nanotechnology, Wiley Publishing Inc. USA.
- J. H. Fendler, 2007, Nano particles and Nano structured films; Preparation, Characterization and Applications, John Wiley and Sons.

REFERENCE BOOKS

- B. S. Murty et al (2012) *Textbook of Nanoscience and Nanotechnology*, Universities Press.
- Dr. Parag Diwan and Ashish Bharadwaj, the Nanoscope (Encyclopedia of Nanoscience and Nanotechnology), (2005) Vol. IV - Nanoelectronics Pentagon Press, New Delhi.

E – Resources

- www.its.caltec.edu/feyman/plenty.html
- <http://www.library.ualberta.ca/subject/nanoscience/guide/index.cfm>
- <http://www.understandingnano.com>
- <http://www.nano.gov>
- <http://www.nanotechnology.com>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Gain a fundamental of nanoscience, delve into various types of nanomaterials, and grasp the surface effects associated with these materials.	K1/K2
CO-2	Develop the various physical, mechanical, optical, electrical, and magnetic properties of nanomaterials.	K3
CO-3	Analyze the processes and mechanisms involved in the synthesis and fabrication of nanomaterials.	K4
CO-4	Explain the various characterizations of nano-products through diffraction, spectroscopic, microscopic, and other techniques.	K5
CO-5	Develop the concepts of nanoscience and technology in the field of sensors, robotics, purification of air and water and in the energy devices.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	1	2	2	2
CO-2	3	3	2	3	3	3
CO-3	3	2	3	3	3	3
CO-4	3	2	3	3	3	3
CO-5	3	2	3	3	3	3

Higher Correlation- 70% Medium Correlation- 27% Lower Correlation –03%

MEDICAL PHYSICS PPHM310

Semester	: IV	Credit	: 3
Category	: Core XIV	Hours /Weeks	: 4
Class & Major	: II M.Sc Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the major applications of Physics to Medicine.
CO-2	Examine the assistance provided by various medical devices, including X-ray machines, gamma cameras, accelerators, and nuclear magnetic resonance.
CO-3	Outline the principles of physics underlying various medical radiation devices and their recent advancements, particularly in medical radiation therapy and diverse applications within medical physics.
CO-4	Introduce the ideas of Radiography.
CO-5	Establish a solid foundation for future studies and research endeavors.

UNIT I: X-RAYS AND TRANSDUCERS

11 Hours

Electromagnetic Spectrum – Production of X-Rays – X-Ray Spectrum – Bremsstrahlung – Characteristic X-Ray – X-Ray Tubes – Coolidge Tube – X-Ray Tube Design – Thermistors – photo electric transducers – Photo voltaic cells – photo emissive cells –Photoconductive cells– piezoelectric transducer.

UNIT II: BLOOD PRESSURE MEASUREMENTS

10 Hours

Introduction –sphygmomanometer – Measurement of heart rate – basic principles of electrocardiogram (ECG) –Basic principles of electro-neurography (ENG) – Basic principles of magnetic resonance imaging (MRI).

UNIT III: RADIATION PHYSICS

10 Hours

Radiation Units – Exposure – Absorbed Dose – Rad to Gray – Kera Relative Biological Effectiveness –Effective Dose – Sievert (Sv) – Inverse Square Law – Interaction of radiation with Matter – Linear Attenuation Coefficient – Radiation Detectors –Thimble Chamber – Condenser Chambers – Geiger Counter – Scintillation Counter.

UNIT IV: MEDICAL IMAGING PHYSICS

10 Hours

Radiological Imaging – Radiography – Filters – Grids – Cassette – X-Ray Film – Film processing – Fluoroscopy – Computed Tomography Scanner – Principal Function – Display – Mammography – Ultrasound Imaging – Magnetic Resonance Imaging – Thyroid Uptake System – Gamma Camera (Only Principle, Function and display).

UNIT V: RADIATION PROTECTION

11 Hours

Principles of Radiation Protection – Protective Materials – Radiation Effects – Somatic – Genetic Stochastic and Deterministic Effect – Personal Monitoring Devices – TLD Film Badge – Pocket Dosimeter.

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- Dr. K. Thayalan, 2003, *Basic Radiological Physics*, Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi.
- C. Dowdey and Murry, 1990, *Christensen's Physics of Diagnostic Radiology*:Lippincot Williams and Wilkins.
- F. M. Khan, 2003, *Physics of Radiation Therapy*, William and Wilkins, 3rd Edition.
- D. J. Dewhurst, 2014, *an Introduction to Biomedical Instrumentation*, 1st Edition, Elsevier Science.
- R. S. Khandpur, 2005, *Hand Book of Biomedical Instrumentations*, 1st Edition, TMG, New Delhi.

REFERENCE BOOKS

- Muhammad Maqbool, 2017, *an Introduction to Medical Physics*, 1st Edition, Springer International Publishing.
- D. Jiráková, FrantišekVítek, 2018, *Basics of Medical Physics*, 1st Edition, Charles University, Karolinum Press.
- Anders Brahme, 2014, *Comprehensive Biomedical Physics*, Volume 1, 1st Edition, Elsevier Science.
- K. Venkata Ram, 2001, *Bio-Medical Electronics and Instrumentation*, 1st Edition, Galgotia Publications, New Delhi.
- J. R. Cameron and J. G. Skofronick, 2009, *Medical Physics*, John Wiley Interscience Publication, Canada, 2nd edition.

E –Resources

- <https://nptel.ac.in/courses/108/103/108103157/>
- <https://www.studocu.com/en/course/university-of-technology-sydney/medical-devices-and-diagnostics/225692>
- https://www.technicalsymposium.com/alllecturenotes_biomed.html
- <https://lecturenotes.in/notes/17929-note-for-biomedical-instrumentation-bi-by-deepraj-adhikary/78>
- <https://www.modulight.com/applications-medical>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Learn the fundamentals, production and applications of X-rays.	K1/K2
CO-2	Develop the knowledge about blood pressure measurements, sphygmomanometer, ECG, ENG and basic principles of MRI.	K3
CO-3	Analyze their process about Radiological imaging and filters.	K4
CO-4	Assess the principles of radiation protection.	K5
CO-5	Develop a physiological assist device for monitoring and treatment proposes for society.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	3	2	2
CO-2	3	1	2	3	3	3
CO-3	3	1	2	3	3	3
CO-4	3	1	2	3	3	3
CO-5	3	1	2	3	3	3

Higher Correlation- 60% Medium Correlation- 23% Lower Correlation –17%

CHARACTERIZATION OF MATERIALS PPHD301

Semester	: IV	Credit	: 2
Category	: Core XIV	Hours /Weeks	: 4
Class & Major	: II M.Sc Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the principles and instrumentation of TGA, DTA and DSC.
CO-2	Explore various optical microscopy techniques including Bright field, Dark field, Phase contrast, Differential interference contrast, Fluorescence, Confocal, and Digital holographic microscopy.
CO-3	Study the working principles, instrumentation, sample preparation, and data analysis techniques for Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM).
CO-4	Explore two-probe and four-probe methods, van der Pauw method, Hall probe measurements, and their applications in material characterization.
CO-5	Learn about powder diffractometry, interpretation of diffraction patterns, phase identification, residual stress analysis, particle size, and texture studies using X-ray techniques.

UNIT I: THERMAL ANALYSIS

11 Hours

Introduction – thermogravimetric analysis (TGA) – instrumentation – determination of weight loss and decomposition products – differential thermal analysis (DTA)- cooling curves – differential scanning calorimetry (DSC) – instrumentation – specific heat capacity measurements – determination of thermomechanical parameters.

UNIT II: MICROSCOPIC METHODS

10 Hours

Optical Microscopy: optical microscopy techniques – Bright field optical microscopy – Dark field optical microscopy – Dispersion staining microscopy - phase contrast microscopy –differential interference contrast microscopy - fluorescence microscopy - confocal microscopy - digital holographic microscopy - oil immersion objectives - quantitative metallography - image analyzer.

UNIT III: ELECTRON MICROSCOPY AND SCANNING PROBE MICROSCOPY

10 Hours

SEM, EDAX, EPMA, TEM: working principle and Instrumentation – sample preparation –Data collection, processing and analysis- Scanning tunneling microscopy (STEM) - Atomic force microscopy (AFM) - Scanning new field optical microscopy.

UNIT IV: ELECTRICAL METHODS AND OPTICAL CHARACTERISATION **10 Hours**

Two probe and four probe methods- van der Pauw method – Hall probe and measurement – scattering mechanism – C-V characteristics – Schottky barrier capacitance – impurity concentration – electrochemical C-V profiling – limitations. Photoluminescence – light – matter interaction – instrumentation – electroluminescence – instrumentation – Applications.

UNIT V: X-RAY AND SPECTROSCOPIC METHODS **11 Hours**

Principles and instrumentation for UV-Vis-IR, FTIR spectroscopy, Raman spectroscopy, ESR, NMR, NQR, XPS, AES and SIMS-proton induced X-ray Emission spectroscopy (PIXE) – Rutherford Back Scattering (RBS) analysis-application - Powder diffraction - Powder diffractometer -interpretation of diffraction patterns - indexing - phase identification - residual stress analysis - Particle size, texture studies - X-ray fluorescence spectroscopy .

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- R. A. Stradling and P. C. Klipstain 1990, Growth and Characterization of semiconductors. Adam Hilger, Bristol.
- J. A. Belk, 1979, Electron microscopy and microanalysis of crystalline materials. Applied Science Publishers, London.
- L. E. Murr 1991, Electron and Ion microscopy and Microanalysis principles and Applications. Marcel Dekker Inc., New York.
- D. Kealey and P. J. Haines 2002, Analytical Chemistry. Viva Books Private Limited, New Delhi.
- Li, Lin, Ashok Kumar, 2008, Materials Characterization Techniques Sam Zhang; CRC Press.

REFERENCE BOOKS

- B. D. Cullity, and R. S. Stock, 2001, "Elements of X-Ray Diffraction", Prentice-Hall.
- Murphy and B. Douglas, 2001, Fundamentals of Light Microscopy and Electronic Imaging, Wiley-Liss, Inc. USA.
- A. K. Tyagi, Roy and S. Banerjee, 2009, Advanced Techniques for Materials Characterization, Materials Science Foundations (monograph series), Volumes 49 – 51.
- W. W. Wendlandt, 1986, Thermal Analysis, John Wiley & Sons.
- J. B. Wachtman, Z. H. Kalman, 1993, Characterization of Materials, Butterworth Heinemann.

E – Resources

- [https://cac.annauniv.edu/uddetails/udpg_2015/77.%20Mat%20Sci\(AC\).pdf](https://cac.annauniv.edu/uddetails/udpg_2015/77.%20Mat%20Sci(AC).pdf)
- <http://www.digimat.in/nptel/courses/video/113106034/L11.html>
- <https://nptel.ac.in/courses/104106122>
- <https://nptel.ac.in/courses/118104008>
- <https://www.sciencedirect.com/journal/materials-characterization>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the TGA, DTA, DSC and TMA thermal analysis techniques and make interpretation of the results.	K1/K2
CO-2	Develop the concept of image formation in optical microscope, and their applications.	K3
CO-3	Analyze the functions about the operation of SEM, TEM, STM and AFM and their results.	K4
CO-4	Compare Hall measurement, four –probe resistivity measurement, C-V, I-V, Electrochemical, Photoluminescence and electroluminescence experimental techniques with necessary theory.	K5
CO-5	Compose the theory and experimental procedure for x- ray diffraction and some important spectroscopic techniques and their applications.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	2	2	3	3
CO-3	3	1	3	3	3	3
CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

Higher Correlation- 63% Medium Correlation- 20% Lower Correlation –17%

NUCLEAR AND PARTICLE PHYSICS**PPHM406**

Semester	: IV	Credit	: 4
Category	: Core XII	Hours /Weeks	: 5
Class & Major	: II M.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the concepts of nuclear stability and mass calculations using the liquid drop model and the Weizsacker mass formula.
CO-2	Imparts an in-depth knowledge on the nuclear force, experiments to study it and the types of nuclear reactions and their principles.
CO-3	Study resonances in nuclear reactions, Breit-Wigner formula, and compound nuclear reactions.
CO-4	Explore nuclear isomers, angular momentum, parity selection rules, and their experimental implications.
CO-5	Mindful of the application of nuclear systems.

UNIT I: NUCLEAR MODELS**14 Hour**

Liquid drop model – Weizsacker mass formula – Isobaric mass parabola –Mirror Pair - Bohr Wheeler theory of fission – shell model – spin-orbit coupling – magic numbers – angular momenta and parity of ground states – magnetic moment – Schmidt model – electric Quadrupole moment - Bohr and Mottelson collective model – rotational and vibrational bands.

UNIT II: NUCLEAR FORCES**12 Hour**

Nucleon – nucleon interaction – Tensor forces – properties of nuclear forces – ground state of deuteron – Exchange Forces - Meson theory of nuclear forces – Yukawa potential – nucleon-nucleon scattering – effective range theory – spin dependence of nuclear forces - charge independence and charge symmetry – isospin formalism.

UNIT III: NUCLEAR REACTIONS**13 Hour**

Reaction Energetics - Kinds of nuclear reactions – Reaction kinematics – Q-value – Threshold energy - Partial wave analysis of scattering and reaction cross section – scattering length – Compound nuclear reactions – Reciprocity theorem – Resonances – Breit Wigner one level formula – Direct reactions - Nuclear Chain reaction – four factor formula.

UNIT IV: NUCLEAR DECAY**12 Hour**

Electromagnetic decays - Beta decay – Continuous Beta spectrum – Fermi theory of beta decay - Comparative Half-life –Fermi Kurie Plot – mass of neutrino – allowed and forbidden decay — neutrino physics – Helicity - Parity violation - Gamma decay – multipole radiations – Angular Correlation - internal conversion – nuclear isomerism – angular momentum and parity selection rules

UNIT V: ELEMENTARY PARTICLES**14 Hour**

Classification of Elementary Particles – Fundamental interactions - Types of Interaction and conservation laws – Families of elementary particles – Isospin – Quantum Numbers – Strangeness – Hypercharge and Quarks –SU (2) and SU (3) groups-Gell Mann matrices– Gell Mann Okuba Mass formula-Quark Model. Standard model of particle physics – Higgs boson.

TEXT BOOKS

- D. C. Tayal, 2011, Nuclear Physics – Himalaya Publishing House.
- K. S. Krane, 2008, Introductory Nuclear Physics – John Wiley & Sons.
- R. Roy and P. Nigam, 1996, Nuclear Physics – New Age Publishers.
- S. B. Patel, 2011, Nuclear Physics – An introduction – New Age International Pvt Ltd Publishers.
- S. Glasstone, 1968, Source Book of Atomic Energy – Van Nostrand Reinhold Inc.,U.S.- 3rd Revised edition.

REFERENCE BOOKS

- L. J. Tassie, 1973, The Physics of elementary particles – Prentice Hall Press.
- H. A. Enge, 1974, Introduction to Nuclear Physics – Addison Wesley, Publishing Company. Inc. Reading. New York.
- Kaplan, Nuclear Physics, 1989 – 2nd Ed., Narosa.
- H. S. Hans, 2001, Nuclear Physics: Experimental and Theoretical, New Age International Publishers, New Delhi.
- B. L. Cohen, 2001, Concepts of Nuclear Physics – McGraw Hill Education (India) Private Limited; 1st edition.
- B.L. Cohen, 1971, Concepts of Nuclear Physics, TMCH, New Delhi.

E – Resources

- <http://bubl.ac.uk/link/n/nuclearphysics.html>
- http://www.phys.unsw.edu.au/PHYS3050/pdf/Nuclear_Models.pdfhttp://www.scholarpedia.org/article/Nuclear_Forces

- <https://www.nuclear-power.net/nuclear-power/nuclear-reactions/>
- http://labman.phys.utk.edu/phys222core/modules/m12/nuclear_models.html

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Acquire essential knowledge on nuclear models and related theories.	K1/K2
CO-2	Apply the theories related to the nuclear forces and related through the problems.	K3
CO-3	Functions about different nuclear models to explain their nuclear phenomena and the concept of resonances through Briet-Weigner single level formula.	K4
CO-4	Explain the data from nuclear scattering experiments to identify different properties of the nuclear force.	K5
CO-5	Solve the reaction mechanism of elementary particles.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	3	2	2
CO-2	3	3	1	3	3	3
CO-3	3	3	1	3	3	3
CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 77%

Medium Correlation- 17%

Lower Correlation –06%

SPECTROSCOPY PPHM407

Semester : IV

Credit : 4

Category : Core XIII

Hours /Weeks : 5

Class & Major : II M.Sc physics

Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand physical principles and the mathematical background important to quantum mechanical descriptions.
CO-2	Describe the propagation of a particle in a simple, one-dimensional potential.
CO-3	Understand the Schrodinger's equation to obtain eigenvectors and energies for particle in a three-dimensional potential.
CO-4	Explain the mathematical formalism and the significance of constants of motion, and see their relation to fundamental symmetries in nature
CO-5	Learn the Approximation methods like perturbation theory, Variational and WKB methods for solving the Schrödinger equation.

UNIT I: MICROWAVE SPECTROSCOPY

13 Hours

Rotational spectra of diatomic molecules - Rigid Rotor (Diatomic Molecules)-reduced mass – rotational constant - - Effect of isotopic substitution - Non rigid rotator – centrifugal

distortion constant- Intensity of Spectral Lines- Polyatomic molecules – linear – symmetric asymmetric top molecules - Hyperfine structure and quadrupole moment of linear molecules - Instrumentation techniques – analysis by infrared techniques- characteristic and group frequencies- block diagram -Information Derived from Rotational Spectra- Stark effect-Problems.

UNIT II: INFRA-RED SPECTROSCOPY

13 Hours

Vibrations of simple harmonic oscillator – zero-point energy- Anharmonic oscillator – fundamentals, overtones and combinations- Diatomic Vibrating Rotator- PR branch – PQR branch- Fundamental modes of vibration of H₂O and CO₂ -Introduction to application of vibrational spectra- IR Spectrophotometer Instrumentation (Double Beam Spectrometer) – Fourier Transform Infrared Spectroscopy - Interpretation of vibrational spectra– remote analysis of atmospheric gases like N₂O using FTIR by National Remote Sensing Centre (NRSC), India– other simple applications

UNIT III: RAMAN SPECTROSCOPY

13 Hours

Theory of Raman Scattering - Classical theory – pure rotational Raman spectrum – vibrational Raman spectra – Differences between Raman and infrared spectra - molecular polarizability – polarizability ellipsoid - Quantum theory of Raman effect - rotational Raman spectra of linear molecule - symmetric top molecule – Stokes and anti-stokes line- SR branch -Raman activity of H₂O and CO₂ .Mutual exclusion principle- determination of N₂O structure -Instrumentation technique and block diagram -structure determination of planar and non-planar molecules using IR and Raman techniques - FT Raman spectroscopy- SERS

UNIT IV: RESONANCE SPECTROSCOPY

13 Hours

Nuclear and Electron spin-Interaction with magnetic field - Population of Energy levels - Larmor precession- Relaxation times - Double resonance- Chemical shift and its measurement - NMR of Hydrogen nuclei - Indirect Spin -Spin Interaction – interpretation of simple organic molecules - Instrumentation techniques of NMR spectroscopy – NMR in Chemical industries- MRI Scan
Electron Spin Resonance: Basic principle –Total Hamiltonian (Direct Dipole-Dipole interaction and Fermi Contact Interaction) – Hyperfine Structure (Hydrogen atom) – ESR Spectra of Free radicals –g-factors – Instrumentation - Medical applications of ESR

UNIT V: UV SPECTROSCOPY

13 Hours

Origin of UV spectra - Laws of absorption – Lambert Bouguer law – Lambert Beer law - molar absorptivity – transmittance and absorbance - Color in organic compounds- Absorption by organic Molecule -Chromophores -Effect of conjugation on chromophores - Choice of Solvent and Solvent effect - Absorption by inorganic systems - Instrumentation - double beam UV-Spectrophotometer -Simple applications.

TEXT BOOKS

- G. Aruldas, 2007, Molecular and Structure and Spectroscopy, PHI PVT, Ltd, New Delhi.
- H. Kaur, 2017, Spectroscopy, Pragati Prakashan, Meerut.
- D. N. Satyanarayana, 2001, *Vibrational Spectroscopy and Applications*, New Age International Publication.
- B. K. Sharma, 2015, *Spectroscopy*, Goel Publishing House Meerut.
- P. S. Kalsi, 2016, *Spectroscopy of Organic Compounds* (7th Edition), New Age International Publishers.

REFERENCE BOOKS

- J. L. McHale, 2008, Molecular Spectroscopy, Pearson Education India, New Delhi.
- J. M. Hollas, 2002, Basic Atomic and Molecular Spectroscopy, Royal Society of Chemistry, RSC, Cambridge.
- C. Banwell, E. M. 2013, McCash, Fundamentals of Molecular Spectroscopy, TMH publishers.
- D. N. Satyanarayana, 2004, Vibrational Spectroscopy and Applications, New Age International Publications, New Delhi.
- G. R. Chatwal and S. K. Anand, 2016, Spectroscopy (Atomic & Molecular), Himalaya Publishing House.
- M. N. Avadhanulu, 2001, an Introduction to Laser: Theory and Applications, S. Chand and Co., New Delhi.
- P. K. Palanisamy, Physics for Engineering, Scitech Publishing Pvt. Ltd., Chennai.

E – Resources

- <https://www.youtube.com/watch?v=0iQhirTf2PI>
- <https://www.coursera.org/lecture/spectroscopy/introduction-3N5D5>
- <https://www.coursera.org/lecture/spectroscopy/infrared-spectroscopy-8jEee>
- https://onlinecourses.nptel.ac.in/noc20_cy08/preview
- <https://www.coursera.org/lecture/spectroscopy/nmr-spectroscopy-introduction-XCWRu>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the fundamental concepts and applications of microwave, IR, Raman and other spectroscopic methods; explain the basic, principle and underlying quantum concepts of spectroscopy.	K1/K2
CO-2	Choose suitable spectroscopic technique and examine the chemical composition of a material. Familiarize to differentiate various types of spectra.	K3
CO-3	Analyze the NMR and FTIR spectra of various samples and identify their chemical structure, understand the spectroscopic applications in allied fields.	K4
CO-4	Explain pure rotational Raman spectra and understand the techniques in instrumentation.	K5
CO-5	Develop the knowledge acquired and use spectroscopic instruments to examine and develop new materials. Motivate towards research in spectroscopy.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	1	2	2	2
CO-2	3	3	1	2	3	3
CO-3	3	3	1	3	3	3
CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 67% Medium Correlation- 17% Lower Correlation –16%

**NUMERICAL METHODS AND COMPUTER PROGRAMMING
PPHM408**

Semester	: IV	Credit	: 4
Category	: Core XIV	Hours /Weeks	: 5
Class & Major	: II M.Sc Physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the different numerical approaches and to solve a problems.
CO-2	Interpret the Knowledge about linear system of equations.
CO-3	Understand the Interpolation and Curve fitting.
CO-4	Categorize Differential equations and their Applications.
CO-5	Understand the basics of computer C programming about Numerical methods.

UNIT I: SOLUTIONS OF EQUATIONS 13 Hours

Zeros or Roots of an equation - Non-linear algebraic equation and transcendental equations - Zeros of polynomials –Roots of polynomials, nonlinear algebraic equations and transcendental equations using Bisection and Newton-Raphson methods – Convergence of solutions in Bisection and Newton-Raphson methods – Limitations of Bisection and Newton-Raphson methods.

UNIT II: LINEAR SYSTEM OF EQUATIONS 13 Hours

Simultaneous linear equations and their matrix representation– Inverse of a Matrix – Solution of simultaneous equations by Matrix inversion method and its limitations – Gaussian elimination method – Gauss Jordan method – Seidel method of Iteration -Inverse of a matrix by Gauss elimination method - Eigen values and eigenvectors of matrices – Direct method - Power method and Jacobi Method to find the Eigen values and Eigen vectors.

UNIT III: INTERPOLATION AND CURVE FITTING 13 Hours

Interpolation with equally spaced points - Newton forward and backward interpolation - Central difference formula - Interpolation with unevenly spaced points - Lagrange interpolation – Curve fitting – Method of least squares – Fitting a polynomial - Lagrange’s interpolation formula-Newton’s formula for unequal Intervals.

UNIT IV: DIFFERENTIATION, INTEGRATION AND SOLUTION OF DIFFERENTIAL EQUATIONS 13 Hours

Numerical differentiation – Numerical integration – Trapezoidal rule – Simpson’s rule – Error estimates – Gauss-Legendre, Gauss-Laguerre, Gauss-Hermite and Gauss-Chebyshev quadrature – solution of ordinary differential equations – Euler and Runge Kutta methods.

UNIT V: PROGRAMMING WITH C 13 Hours

Flow-charts – Integer and floating point arithmetic expressions – Built-in functions – Executable and non-executable statements – Subroutines and functions – Programs for the following computational methods: (a) Zeros of polynomials by the bisection method, (b) Zeros of polynomials/non-linear equations by the Newton-Raphson method, (c) Newton’s

forward and backward interpolation, Lagrange Interpolation, (d) Trapezoidal and Simpson's Rules, (e) Solution of first order differential equations by Euler's method.

TEXT BOOKS

- V. Rajaraman, 1993, Computer oriented Numerical Methods, 3rd Edition. PHI, New Delhi
- M. K. Jain, S. R. Iyengar and R. K. Jain, 1995, Numerical Methods for Scientific and Engineering Computation, 3rd Edition, New Age Intl., New Delhi
- S. S. Sastry, Introductory Methods of Numerical analysis, PHI, New Delhi
- F. Scheid, 1998, Numerical Analysis, 2nd Edition, Schaum's series, McGraw Hill, New York
- W. H. Press, S. A. Teukolsky, W. T. Vetterling and B. P. Flannery, 1992, Numerical Recipes in FORTRAN, 2nd Edition, Cambridge Univ. Press

REFERENCE BOOKS

- S. D. Conte and C. de Boor, 1981, Elementary Numerical analysis-an algorithmic approach, 3rd Edition, McGraw Hill,
- B. F. Gerald, and P. O. Wheatley, 1994, Applied Numerical analysis, 5th Edition, Addison-Wesley, MA.
- B. Carnagan, H. A. Luther and J. O. Wilkes, 1969, Applied Numerical Methods, Wiley, New York.
- S. S. Kuo, 1996, Numerical Methods and Computers, Addison-Wesley.
- V. Rajaraman, Programming in FORTRAN / Programming in C, PHI, New Delhi.

E – Resources

- <https://www.scribd.com/doc/202122350/Computer-Oriented-Numerical-Methods-by-V-RajaRaman>
- [https://www.scirp.org/\(S\(lz5mqp453edsnp55rrgjt55\)\)/reference/referencespapers.aspx?referenceid=1682874](https://www.scirp.org/(S(lz5mqp453edsnp55rrgjt55))/reference/referencespapers.aspx?referenceid=1682874)
- <https://nptel.ac.in/course/122106033/>
- <https://nptel.ac.in/course/103106074/>
- https://onlinecourses.nptel.ac.in/noc20_ma33/preview

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the transcendental equations and analyze the different root finding methods. Understand the basic concept involved in root finding procedure such as Newton Raphson and Bisection methods, their limitations.	K1/K2
CO-2	Identify the simultaneous linear equations and their matrix representation between the various methods and their problems are solving.	K3
CO-3	Compare the concepts for Interpolation and curve fitting.	K4
CO-4	Evaluating Trapezoidal and Simpson's rules and applying their concepts.	K5
CO-5	Create the basics of C-programming and conditional statements.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	3	2	2
CO-2	3	3	1	3	3	3
CO-3	3	3	1	3	3	3

CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 77% Medium Correlation- 17% Lower Correlation –06%

COMMUNICATION ELECTRONICS

PPHO401

Semester	: IV	Credit	: 3
Category	: Core XIV	Hours /Weeks	: 5
Class & Major	: II M.Sc physics	Total Hours	: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the transmission of electromagnetic waves through various types of antennas and gain knowledge about wave propagation through Earth's atmosphere and along its surface.
CO-2	Acquire understanding in the generation and propagation of microwaves.
CO-3	Acquire knowledge about radar systems and their applications, as well as understand the working principle of color television.
CO-4	Learn about the working principle of fiber optics and its application in telecommunications.
CO-5	Will learn about the general theory and operation of satellite communication systems.

UNIT I: ANTENNAS AND WAVE PROPAGATION 13 Hours

Radiation field and radiation resistance of short dipole antenna-grounded antenna-ungrounded antenna-antenna arrays-broadside and end side arrays-antenna gain-directional high frequency antennas-sky wave-ionosphere- Eccles and Larmor theory- Magneto ionic theory-ground wave propagation.

UNIT II: MICROWAVES 13 Hours

Microwave generation—multi cavity Klystron-reflex klystron-magnetron travelling wave tubes (TWT) and other microwave tubes-MASER-Gunn diode-wave guides-rectangular wave guides-standing wave indicator and standing wave ratio(SWR).

UNIT III: RADAR AND TELEVISION 13 Hours

Elements of a radar system-radar equation-radar performance Factors radar transmitting systems-radar antennas-duplexers-radar receivers and indicators-pulsed systems-other radar systems- colour TV transmission and reception-colour mixing principle-colour picture tubes- Delta gun picture tube-PIL colour picture tube-cable TV, CCTV and theatre TV.

UNIT IV: OPTICAL FIBER 13 Hours

Propagation of light in an optical fibre-acceptance angle-numerical aperture-step and graded index fibres-optical fibres as a cylindrical wave guide-wave guide equations-wave guide equations in step index fibres - fibre losses and dispersion-applications.

UNIT V: SATELLITE COMMUNICATION 13 Hours

Orbital satellites-geostationary satellites-orbital patterns-satellite system link models-satellite system parameters-satellite system link equation link budget-INSAT communication satellites.

Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- Gupta and Kumar, 2008, Handbook of Electronics by 3rd edition.
- G. Kennedy and Davis, 1988, Electronic communication systems, Tata McGraw Hill, 4th Edition.
- Taub and Schilling, 1991, principles of communication systems, second edition, Tata Mc Graw Hill.
- M. Kulkarani, 1998, Microwave and radar engineering, Umesh Publications.
- R. R. Ghulathi , Mono Chrome and colour television.

REFERENCE BOOKS

- D. Roody and Coolen, 1995, Electronic communications, Prentice Hall of India, IV edition.
- W. Tomasi, 1998, Advanced electronics communication systems, 4th Edition, Prentice Hall of India.
- S. Salivahanan, N. Suersh Kumar and A. Vallavaraj, 2009, Electronic Devices and Circuits, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd Edition.

E – Resources

- <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials>
- <https://www.polytechnichub.com/difference-analog-instruments-digital-instruments>
- <http://nptel.iitm.ac.in>
- <http://web.ewu.edu>
- <http://nptel.iitm.ac.in>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Understand the basic principle of antenna and its use according to its radiation pattern.	K1/K2
CO-2	Identify the configuration of optical fiber cable and its uses in digital communication system.	K3
CO-3	Examine the operational designs of diverse radar systems, employing radar principles to detect, locate, track, and identify objects across substantial distances.	K4
CO-4	Explain the satellite orbital pattern, satellite positions and possibility of line sight for communication between earth station and satellite.	K5
CO-5	Improve social communication in remote areas and research activities such as space science, remote sensing and weather prediction.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	1	2	2	2	2
CO-2	3	1	3	3	3	3
CO-3	3	1	3	3	3	3

CO-4	3	1	3	3	3	3
CO-5	3	1	3	3	3	3

Higher Correlation- 70% Medium Correlation- 13% Lower Correlation –17%

**SOLAR ENERGY UTILIZATION
PPHD401**

Semester	: IV	Credit	: 2
Category	: Core XIV	Hours /Weeks	: 4
Class & Major	: II M.Sc Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	Enable the students
CO-1	Impart basic principles of solar energy utilization.
CO-2	Provide sufficient exposure to industries related to solar energy.
CO-3	Harness entrepreneurship skills about Solar Energy Utilization.
CO-4	Comprehend various types of solar cells and direct their application across different sectors of society.
CO-5	Cultivate an entrepreneurial mindset through the utilization of renewable energy sources.

UNIT I: HEAT TRANSFER & RADIATION ANALYSIS 10 Hours

Conduction, Convection and Radiation – Solar Radiation at the earth’s surface - Determination of solar time – Solar energy measuring instruments.

UNIT II: SOLAR COLLECTORS 10 Hours

Physical principles of conversion of solar radiation into heat flat plate collectors - General characteristics – Focusing collector systems – Thermal performance evaluation of optical loss.

UNIT III: SOLAR HEATERS 10 Hours

Types of solar water heater - Solar heating system – Collectors and storage tanks – Solar ponds – Solar cooling systems.

UNIT IV: SOLAR ENERGY CONVERSION 11 Hours

Photo Voltaic principles – Types of solar cells – Crystalline silicon/amorphous silicon and Thermo - electric conversion - process flow of silicon solar cells- different approaches on the process- texturization, diffusion, Antireflective coatings, metallization.

UNIT V: NANOMATERIALS IN FUEL CELL APPLICATIONS 11 Hours

Use of nanostructures and nanomaterials in fuel cell technology - high and low temperature fuel cells, cathode and anode reactions, fuel cell catalysts, electrolytes, ceramic catalysts. Use of Nano technology in hydrogen production and storage.

Industrial visit – data collection and analysis – presentation, Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- G. D. Rai, 1987, Solar energy utilization, Khanna publishers, Delhi.

- S. Maheshwar, S. Madhuri, 2010, Carbon “Nano forms and Applications”, Mc Graw-Hill.
- S. A. Kalogirou, 2009, Solar Energy Engineering: Processes and Systems, Academic Press, London.
- G. N. Tiwari, 2002, “Solar Energy – Fundamentals Design, Modelling and applications, Narosa Publishing House, New Delhi.
- S. P. Sukhatme, 2005, Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi.

REFERENCE BOOKS

- R. H. Romer, W.H. Freeman, 1976, Energy – An Introduction to Physics.
- J. A. Drife and William, 1974, Solar energy thermal processes.
- J. W. Twidell & Anthony D. Weir, 2005, ‘Renewable Energy Resources.
- J. A. Duffie, William A. Beckman, 2013, Solar Energy: Thermal Processes, 4th Edition, John Wiley and Sons.
- J. A. Duffie, W. A. Beckman, 2007, “Solar Energy Thermal Process”, John Wiley and Sons.

E – Resources

- <https://pdfs.semanticscholar.org/63a5/a69421b69d2ce9f359bbfc86c63556f9a4fb>
- https://books.google.vg/books?id=l-XHcwZo9XwC&sitesec=buy&source=gbs_vpt_read
- www.nptel.ac.in/courses/112105051
- www.freevideolectures.com
- <http://www.e-booksdirectory.com>

COURSE OUTCOMES:

CO No	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the TGA, DTA, DSC and TMA thermal analysis techniques and make interpretation of the results.	K1/K2
CO-2	Develop the concept of image formation in optical microscope, and their applications.	K3
CO-3	Analyze the functions about the operation of SEM, TEM, STM and AFM and their results.	K4
CO-4	Compare Hall measurement, four –probe resistivity measurement, C-V, I-V, Electrochemical, Photoluminescence and electroluminescence experimental techniques with necessary theory.	K5
CO-5	Compose the theory and experimental procedure for x- ray diffraction and some important spectroscopic techniques and their applications.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	3	1	2	2	2
CO-2	3	3	1	3	3	3
CO-3	3	3	1	3	3	3
CO-4	3	3	1	3	3	3
CO-5	3	3	1	3	3	3

Higher Correlation- 73% Medium Correlation- 10% Lower Correlation –17%

III and IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core - V	PPHM308	Quantum Mechanics –II	Problem Solving	Problem Solving
	Core-VI	PPHM309	Condensed Matter Physics	Seminar	Seminar
	Core Elective-V	PPHO301	Electromagnetic Theory	Seminar	Seminar
	Core Elective-VI	PPHO302	Physics of Nano Science And Technology	Seminar	Poster Presentation
	Core Industry Module -II	PPHM310	Medical Physics	Seminar	Seminar
	Skill Enhancement Course /Interdisciplinary III	PPHD301	Characterization of Materials	Seminar	Poster Presentation
IV	Core-VII	PPHM406	Nuclear and Particle Physics	Seminar	Poster Presentation
	Core-VIII	PPHM407	Spectroscopy	Seminar	Seminar
	Core-IX	PPHM408	Numerical Methods and Computer Programming	Seminar	Problem Solving
	Core Elective-VII	PPHO401	Communication Electronics	Seminar	Seminar
	Skill Enhancement Course – Professional Competency Skill - IV	PPHD401	Solar Energy Utilization	Seminar	Poster Presentation

DEPARTMENT OF CHEMISTRY

PREAMBLE

UG : Programme Profile and the Syllabi of Courses Offered in Semester III and IV Along with III and IV Evaluation Components (with Effect from 2023 – 2026 Batch onwards).

PG: Syllabi of Programme offered in Semester III and IV along with III and IV Evaluation Components (with Effect from 2023 – 2025 Batch onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would be able to
PSO-1	Understand the fundamental concepts in Organic, Inorganic, Physical, Theoretical, Nano, Bioinorganic, Polymer and Forensic Chemistry.
PSO-2	Identify and Estimate the component of organic and Inorganic chemical using classical and modern methods, and to determine the physical properties of compounds.
PSO-3	Predict the structures of compounds, separate and characterize them and understand the Mechanism of reactions of chemical compounds and their synthesis through Practical and Project.
PSO-4	Apply chemical techniques relevant to academia and industry, generic skills and global competencies to complete the competitive World.
PSO-5	Demonstrate importance of Advanced Material, pharmaceutical Drug and polymer material and Devise chemical processes with Green approach in Society needs.
PSO-6	Problem solving abilities for successful career in pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry etc.

B.Sc., CHEMISTRY PROGRAMME PROFILE

Semester	Part	Category	Course Code	Course Title	Contact Hrs/Week	Min/Max
I	I	Tamil/ Hindi/ French	UTAL110 UHIL101 UFRL101	General Tamil-I Hindi-I French-I	5	3
	II	English	UENL111	General English-I	5	3
	III	Core Course I	UCHM112	General Chemistry –I	5	4
		Core Course II	UCHR113	Quantitative Inorganic Estimation (titrimetric) and Inorganic Preparations	5	4
		Elective Course - GE I	UMAA120	Allied Mathematics for Chemistry-I	4	3
	IV	SEC- Foundation Course	UCHF101	Foundation Course	2	2
		SEC-I/NME-I			2	2
		AECC/Soft Skill-I	USKS103	Communicative English	2	2
Total					30	23
II	I	Tamil/ Hindi/ French	UTAL210 UHIL201 UFRL201	General Tamil-II Hindi-II French-II	5	3
	II	English	UENL211	General English-II	5	3
	III	Core Course III	UCHM207	General Chemistry –II	5	4
		Core Practical IV	UCHR208	Qualitative Organic Analysis and preparation of Organic Compounds	5	4
		Elective Course GE II	UMAA224	Allied Mathematics for Chemistry-II	4	3
	IV	SEC-II/NME-II			2	2
		SEC III/DS I	UCHD201	Cosmetic and Personal Grooming	2	2
		AECC/Soft Skill – II	USKS203	Soft Skill –II	2	2
	III	Internship	UINS201		-	-/2
	V	Extension Activity (Outside class Hours)			-	1/2
	VI	Value Added Course			-	-/2
	Total					30	24/29
III	I	Tamil/ Hindi/ French	UTAL310 UHIL301 UFRL301	General Tamil-III Hindi-III French-III	5	3
	II	English	UENL311	General English-III	5	3
	III	Core Course V	UCHM309	General Chemistry –III	4	4
		Core Practical VI	UCHR310	Qualitative Inorganic Analysis	3	3
		Elective Course - GE -III	UPHA301	Allied physics-I	3	2
		Elective Course – GE Practical I	UPHR302	Allied for chemistry practical -I	2	2

	IV	SEC IV / DS II	UCHD301	Pesticide Chemistry	2	2	
		SEC V / (Entrepreneurial)	UCHU302	Entrepreneurial skills in Chemistry	2	1	
		AECC/Soft Skill - III	USKS301	Soft Skill-III	2	2	
		Value Education			2	2	
Total					30	24	
IV	I	Tamil/ Hindi/ French	UTAL410 UHIL401 UFRL401	General Tamil-IV Hindi-IV French-IV	5	3	
		II	English	UENL411	General English-IV	5	3
		III	Core Course VII	UCHM409	General Chemistry –IV	5	4
	Core Practical VIII		UCHR410	Physical Chemistry Practical- I	3	3	
	Elective Course - GE IV		UPHA401	Allied Physics-II	3	2	
	Allied Practical IV		UPHR402	Allied for Chemistry Practical -II	3	2	
	IV	NME - Online Course	UONL401		2	2	
		SEC VI /DS III	UCHD401	Forensic Science	2	2	
	III	AECC/Soft Skill-IV	USKS401	Soft Skill-IV	2	2	
		Internship	UINS401		-	-/2	
		Extension Activity/Physical Education			-	-/2	
	V	Value Added Course (Outside class Hours)			-	-/2	
	Total					30	23/29
V	III	Core Course IX	UCHM513	Organic Chemistry I	5	4	
		Core Course X	UCHM514	Inorganic Chemistry I	5	4	
		Core Course XI	UCHM515	Physical Chemistry I	5	4	
		Core XII Project	UCHP501	Project with viva voce	4	4	
		Elective Course - DS V	UCHO516	Biochemistry	5	3	
		Elective Course DS VI	UCHO517	Industrial Chemistry	4	3	
	IV	Environmental Studies			2	2	
Total					30	24	
VI	III	Core Course XIII	UCHM618	Organic Chemistry -II	5	4	
		Core Course XIV	UCHM619	Inorganic Chemistry - II	5	4	
		Core Course XV	UCHM620	Physical Chemistry -II	5	4	
		Core Course XVI	UCHM621	Physical Chemistry Practical II	3	2	
		Elective Course - DS VII	UCHO607	Fundamentals of Spectroscopy	4	2	
		Elective Course – DS VIII	UCHO608	Pharmaceutical Chemistry	4	3	
		Comprehensive Viva-voce	UCHM605	Comprehensive Viva-voce	-	1	

	III	Professional Competency Skill	UCHC601		4	2
		Internship	UINS601		-	-/2
		Extension Activity/Physical Education			-	-/2
	V	Value Added Course (Outside class Hours)			-	-
Total					30	22/26
Grand Total					180	140/155

**LIST OF COURSES OFFERED TO OTHER DEPARTMENTS
ALLIED AND ALLIED OPTIONAL COURSES**

Semester	Part	Category	Course Code	Course Title	Contact Hrs per week	Credits
III	III	Allied-I	UCHA301	Chemistry for Physical Sciences I	3	2
III	III	Allied Practical-I	UCHR302	Chemistry Practical for Physical Sciences I	2	2
IV	III	Allied-II	UCHA401	Chemistry for Physical Sciences II	3	2
IV	III	Allied Practical-II	UCHR402	Chemistry Practical for Physical Sciences II	3	2

Extra Credit Earning Provision

Semester	Category	Course Code	Course Title	Contact Hrs per Week	Credits
					Min/Max
IV	Core	UINS401	Internship	30/60 Hours	1/2
IV	Core	UCHS601	Green Chemistry		1

GENERAL CHEMISTRY III
UCHM309

Semester : III
Category : Core V/DSC-V
Class & Major: II B.Sc., Chemistry

Credit : 04
Hours/Week : 04
Total Hours : 52

Course Objective

CO No.	To enable the students to
CO-1	Understand the physical properties of gases, liquids, solids and X-ray diffraction of solids.
CO-2	Recall the fundamentals of d- block elements.
CO-3	Relate the aromatic halogen compounds and aryl alkyl halides.
CO-4	Infer the compressibility factor Z, and its variation with pressure for different gases.
CO-5	Classify the crystal systems of Bravais lattices, X –ray diffraction and Bragg's equation

UNIT – I: States of Matter-I

10 Hours

Gaseous state - Kinetic gas equation - Postulates and Derivation - Gas laws from the kinetic gas equation. Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities. Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

UNIT: II States of Matter-II

09 Hours

Liquid state - Density – Diffusion - Viscosity – Evaporation – Surface tension Determination using Stalagmometer - Effect of temperature on surface tension - Parachor - Definition and Applications only - Coefficient of Viscosity- determination using Oswald's Viscometer- Effect of Temperature and Pressure. Liquid crystals - Classification and Applications.

UNIT-III Chemistry of p- Block Elements (Group 16, 17 & 18)

11 Hours

Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids – Anomalous Behavior of Oxygen - Oxyacids of Sulphur (Structure only) - Peracids of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid.

Halogens – Group discussion - Comparative study of F, Cl, Br, I and at – Reactivities, hydracids, and oxides– Oxyacids of Halogens (Structure only). Classification of Halides - Comparison of Fluorine with Oxygen-Fluorides of oxygen-Exceptional properties of Fluorine. Interhalogen compounds - Preparation, Properties and Geometry of AX, AX₃, AX₅ and AX₇ type of Compounds – Pseudohalogens and pseudohalides - Cyanogen and Thiocyanogen – Comparison of

Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

Noble gases: Position in the periodic table. Preparation, properties and structure of XeF₂, XeF₄, XeF₆ and XeOF₄; uses of noble gases - clathrate compounds.

UNIT-IV

11 Hours

Halogen derivatives: Aliphatic halogen derivatives Nomenclature and classes of alkyl halides – isomerism, physical properties, Chemical reactions. Nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent.

Di, Tri & Tetra Halogen derivatives: Nomenclature, classification, preparation, properties and applications.

Aromatic halogen compounds: Nomenclature, preparation, properties and uses Mechanism of nucleophilic aromatic substitution – benzyne intermediate.

Aryl alkyl halides: Nomenclature, benzyl chloride – preparation – preparation properties and uses

Alcohols: Nomenclature, classification, preparation, properties, use; conversions – ascent and descent of series; test for hydroxyl groups. Oxidation of diols by periodic acid and lead tetraacetate.

UNIT-V

11 Hours

Phenols: Nomenclature; classification, Preparation from diazonium salts, cumene, Dow's process, Raching process; properties – acidic character and effect of substitution on acidity. Reactions – Fries, claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimen, Kolbe, Schmidt, Gattermann synthesis, Libermann, nitro reaction, phthalein reaction.

Resorcinol, quinol, picric acid – preparation, properties and uses.

Aromatic alcohols :Nomenclature, benzyl alcohol – methods of preparation – hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties, reactions - reaction with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride, hydrogen iodide, oxidation – substitution on the benzene nucleus, uses.

Thiols: Nomenclature, structure, preparation and properties.

Text Books

- B.R. Puri, L.R. Sharma, M.S. Pathania (2020); *Principles of Physical Chemistry*, 46th edition, Vishal Publishing.

- B.R. Puri, L.R. Sharma and K.C. Kalia (2009), *Principles of Inorganic Chemistry*, Milestone Publishers and Distributors, New Delhi, 13th edition.

Reference Books

- T. W. Graham Solomons, (1992), *Organic Chemistry*, John Wiley & Sons, 5th edition.
- A. Carey Francis, (2009), *Organic Chemistry*, Tata McGraw-Hill Education Pvt., Ltd., New Delhi, 7th edition.
- I. L. Finar, (1996) *Organic Chemistry*, Wesley Longman Ltd, England, 6th edition.
- P. L. Soni, and H. M. Chawla (2007)- *Text Book of Organic Chemistry*, New Delhi, Sultan Chand & Sons, 29th edition.
- J.D. Lee, (2005) *Concise Inorganic Chemistry*, Blackwell Science, 5th edition.

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Relate the kinetic properties of gases by using mathematical concepts.	K1, K2
CO2	Classify the various types of crystals with respect to its packing.	K3
CO3	Apply the XRD method for crystal structure determinations.	K4
CO4	Categorize the nomenclature, physical & chemical properties and basic mechanisms of halo-organic compounds and alcohols.	K5
CO5	Investigate the named organic reactions related to phenol; explain the preparation and properties of aromatic alcohol including thiol.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	1	1	0	0
CO2	3	3	2	2	1	0
CO3	3	3	2	3	1	0
CO4	3	3	3	3	2	2
CO5	3	3	3	3	2	2

High Correlation: 47% Medium Correlation: 27% Low Correlation: 13.3% No Correlation: 13.3%

QUALITATIVE INORGANIC ANALYSIS

UCHR310

Semester : III
 Category : Core Practical-VI /DSC-VI
 Class & Major: II B.Sc., Chemistry

Credit : 03
 Hours/Week: 03
 Total Hours : 39

Course Objectives:

CO No.	To enable the students to
CO1	Understand the analytical tool for the quantitative estimation of ions.
CO2	Criticize the fundamental principles of simple acid radicals.
CO3	Determine the analysis of interfering acid radicals.
CO4	Train the students for improving their skill to separate the mixture of two cations and two anions.
CO5	Demonstrate the analysis of basic radical.

Semi - Micro Qualitative Analysis

1. Analysis of simple acid radicals: Carbonate, sulphide, sulphate, thiosulphite, chloride, bromide, iodide, nitrate
2. Analysis of interfering acid radicals: Fluoride, oxalate, borate, phosphate, arsenate, arsenite.
3. Elimination of interfering acid radicals and Identifying the group of basic radicals
4. Analysis of a mixture - I to VIII containing two cations and two anions (of which one is interfering type)
5. Analysis of basic radicals (group wise): Lead, copper, bismuth, cadmium, tin, antimony, iron, aluminium, arsenic, zinc, manganese, nickel, cobalt, calcium, strontium, barium, magnesium, ammonium

Text Books

- Vogels (2012), *Qualitative Inorganic Analysis*, 7th Edn, Pearson Education India.
- Naser Abdulhasan Almatwari (2021) *Principles of qualitative inorganic analysis: Precipitation, separation and identification of cations.*, ISBN:978-981-14-9262-4.

Reference Books:

- V. Venkateswaran, R. Veeraswamy and A. R. Kulandivelu (1997), *Basic Principles of Practical Chemistry*, Sultan Chand & Sons, New Delhi, 2nd edition.

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Acquire knowledge on the systematic analysis of Mixture of salts.	K1, K2
CO2	Identify the cations and anions in the unknown substance.	K3
CO3	Apply the cations and anions in the soil and water and to test the quality of water.	K4
CO4	Assess the role of common ion effect and solubility product	K5
CO5	Demonstrate the appropriate chemical reagents for the find of inorganic salt mixtures.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	1	1	0	0
CO2	3	2	2	2	1	0
CO3	3	3	2	2	1	1
CO4	3	3	3	2	2	1
CO5	3	3	3	2	2	2

High Correlation: 33.3% Medium Correlation: 36.7% Low Correlation: 20% No Correlation: 10%

PESTICIDE CHEMISTRY

UCHD301

Semester : III

Category : SEC-IV/DS II

Class & Major: II B.Sc., Chemistry

Credit : 02

Hours/Week: 02

Total Hours : 26

Course Objectives:

CO No.	To enable the students to
CO1	Understand the various types of pesticides and their toxicity.
CO2	Summarize the accumulation of pesticides in the form of residues and its analysis.
CO3	Knowledge about to choice of alternate and eco-friendly pesticides.
CO4	Relate the pesticides residues in water and effects in aquatic environment.
CO5	Classify the fungicides and herbicides compounds.

UNIT I INTRODUCTION TO PESTICIDE CHEMISTRY

5 Hours

Introduction: History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties.

Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.

UNIT II INSECTICIDES

5 Hours

Insecticides: plant products – Nicotine, pyrethrum, rotenone, and petroleum oils, Inorganic pesticides – arsenical fluorides, borates. Organic pesticides – organochlorine compounds – D.D.T. B.H.C., methoxychlor, chlordane, and endosulfon

UNIT III PESTICIDES RESIDUES

6 Hours

Pesticides residues: Introduction- application of agrochemicals, dissemination pathways of pesticides, causes of pesticide residues, remedies. Pesticides residues in atmosphere- entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water - entry into water systems, action and effect in aquatic environment. Pesticides residues in soil. entry into soil,

absorption, retention and transport in soil, effects on microorganism, soil condition and fertility, decomposition and degradation by climatic factors and microorganism.

UNIT IV FUNGICIDES AND HERBICIDES

5 Hours

Fungicides: Inorganic – Sulphur compounds – Copper compounds – Mercuric compounds
Organic – dithiocarbamates – Dithane, Bordeaux mixture. Herbicides: Inorganic herbicides – Arsenical compounds Boron compounds – Cyanamide – Cyanides and thiocyanates chlorates and sulphamates. Organic herbicides and Nitro – compounds – chlorinated compounds – 2,4D compounds – Propionic and acid derivatives – urea herbicides.

UNIT V BIOPESTICIDES:

5 Hours

Biopesticides: Pheromones, attractants, repellents – Introduction, types and application (8-Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cue-lure, methyl eugenol, N,N- Diethyl-m- toluamide, Dimethyl phthalate, Icaridin). Baits- Metaldehyde, Iron (II) phosphate, Indoxacarb, Zinc Phosphide, Bromadiolone.

Text Books

- Handa SK (2012). *Principles of pesticide chemistry*. Agrobios (India).
- Matolcsy G, Nádasy M, Andriská V (1989). *Pesticide chemistry*. Elsevier.

Reference Books

- Roy N. K., Chemistry of Pesticides ((2010)). *CBS Publisher & Distributors P Ltd*; 1st Ed.
- Nollet L.M., Rathore H.S., (2016). *Handbook of pesticides: methods of pesticide residues analysis*. CRC press.
- Ellerbrock R.H (2005), *Pesticide Residues: Significance, Management and Analysis*.

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Outline of the pesticides and their toxicity with respect to structure and category.	K1, K2
CO2	Explain the Pesticides residues in water and their action and effect in aquatic environment.	K3
CO3	Analyze the decomposition and degradation by climatic factors and microorganism.	K4
CO4	Classify the insecticides with respect to structure, chemical name, physical properties, and chemical properties.	K5
CO5	Demonstrate the extraction and analytical methods of pesticide residues and make awareness to the public on bio- pesticides.	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	1	0
CO2	3	3	2	2	2	2
CO3	3	3	2	3	2	1
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2

High Correlation: 46.7% Medium Correlation: 40% Low Correlation : 10% No Correlation:3.3%

**ENTREPRENEURIAL SKILLS IN CHEMISTRY
UCHU302**

Semester : III	Credit : 01
Category : SEC V	Hours/Week : 02
Class & Major: II B.Sc., Chemistry	Total Hours : 26

Course Objectives:

CO	To enable the students to
CO1	Develop entrepreneur skills in students for making innovative foods.
CO2	Provide hands on experience to prepare and develop products.
CO3	Develop start ups of new food items.
CO4	Understand the concept of baking powder and baking soda preparations.
CO5	Acquire the cognizant about the concept of dye preparations.

UNIT –I**5 Hours**

Food Chemistry: Food adulteration-contamination of food items with clay stones, water and toxic chemicals -Common adulterants.

UNIT II**5 Hours**

Food additives, Natural and synthetic anti-oxidants, glazing agents (hazardous effect), food colorants, Preservatives, leavening agents, Baking powder and baking soda, yeast, MSG, vinegar.

UNIT III**Hands on Experience (Students can choose any four):****6 Hours**

Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques.

UNIT IV**5 Hours**

Entrepreneur items: Preparation of Jam, squash and Jelly, Gulkand, cottage cheese. Preparation of products like candles, soap, detergents, cleaning powder, shampoos, pain balm, tooth paste/powde

raddisinfectants in small scale. Extraction of oils from spices and flowers.

UNIT V

5 Hours

Dyes: Classification – Natural, synthetic dyes and their characteristics – basic methods and principles of dyeing

Testing of water samples using testing kit.

Dyeing – cotton fabrics with natural and synthetic dyes
Printing – tie and dye, batik.

Text Books

- George S & Muralidharan V, (2007) Fibre to Finished Fabric – A Simple Approach, publication Division, University of Madras, Chennai.
- Appaswamy G P, A Handbook on Printing and Dyeing of Textiles.

Reference Books

- Shyam Jha, (2015) *Rapid detection of food adulterants and contaminants* (Theory and ~~Prac~~), Elsevier, e Book ISBN 9087128004289, 1st Edition,.

Course Outcomes:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Recite the adulterated food items by doing simple chemical tests.	K1, K2
CO2	Identify the extraction of oils from spices and flowers.	K3
CO3	Apply the cognizant about adulteration and motivate them to become entrepreneurs.	K4
CO4	Detection of adulterants in food items such as coffee, tea, butter, ghee, milk, etc.,	K5
CO5	Analyse the concept of Dyeing of cotton fabrics with natural and synthetic dyes.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	2	1	0	0
CO2	3	3	2	1	1	0
CO3	3	3	3	3	2	1
CO4	3	3	3	3	2	1
CO5	3	3	3	3	2	2

High Correlation: 50% Medium Correlation: 23.3% Low Correlation: 16.7% No Correlation: 10%

CHEMISTRY FOR PHYSICAL SCIENCE – I

UCHA301

Semester : III
Category : Allied
Class & Major: II B.Sc., Physics

Credit : 03
Hours/Week : 04
Total Hours : 52

Course Objectives:

CO	To enable the students to
CO1	Outline of the atomic orbitals, chemical bonds, and hybridization.
CO2	Relate Concepts of thermodynamics and its applications.
CO3	Apply the radioisotopes for carbon dating, rock dating and medicinal applications.
CO4	Criticize the Importance of chemical industries for fuel gases.
CO5	Analyze the chromatography techniques of column, paper and thin layer chromatography.

UNIT I Chemical Bonding and Nuclear Chemistry**11 Hours**

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. MO diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.

Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers- Differences between chemical reactions and nuclear reactions-. Nuclear fission and nuclear fusion-Radioactive Decay-Radioactive Elements-General Characteristics of Radioactive Decay-Decay Kinetics-Decay Constant-Half Life-Mean Life Period- Applications of radioisotopes – carbon dating, rock dating and medicinal applications.

UNIT II Industrial Chemistry Fuels & Fertilizers**10 Hours**

Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones. **Fertilizers:** Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.

UNIT III Fundamental Concepts in Organic Chemistry Hybridization**10 Hours**

Orbital overlap, hybridization and geometry of CH₄, C₂H₄, C₂H₂ and C₆H₆. Electronic effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric- examples. Reaction mechanisms: Types of reactions– aromaticity (Huckel's rule) – aromatic electrophilic substitution; nitration, halogenation, FriedelCraft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.

UNIT IV-Thermodynamics and Phase Equilibria**11 Hours**

Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free

energy change and its importance (no derivation). Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy.

Phase Equilibria: Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system - Reduced phase rule and its application to a simple eutectic system (Pb-Ag).

UNIT V-Analytical Chemistry

10 Hours

Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques – extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.

Text Books

- V. Veeraiyan, (2009.) *Text book of Ancillary Chemistry*; High mount publishing house, Chennai, first edition,.
- S.Vaithyanathan (2006.), *Text book of Ancillary Chemistry*; Priya Publications, Karur,

Reference Book

- P. L. Soni, Mohan Katyal, (2007), *Text book of Inorganic chemistry*; Sultan Chand and Company, NewDelhi, twentieth edition.
- B. R. Puri, L. R. Sharma, M. S. Pathania, (2018) *Text book Physical Chemistry*; Vishal Publishing Co.,New Delhi, forty forty seventh edition.
- B. K, Sharma, (2014) *Industrial Chemistry*; GOEL publishing house, Meerut, sixteenth edition.

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Gain in-depth knowledge about the theories of nuclear reactions and radioactivity.	K1, K2
CO2	Classify the efficiencies and uses of various fuels and fertilizers.	K3
CO3	Categorize the type of hybridization, electronic effect and mechanism involved in the organic reactions.	K4
CO4	Relationship between Gibbs free energy and entropy for thermodynamics.	K5
CO5	Explain various methods to identify an appropriate method for the separation of two components.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	1	1	0	0
CO2	3	2	2	1	0	0

CO3	3	3	2	1	1	0
CO4	3	2	2	2	1	2
CO5	3	2	3	3	2	2

High Correlation: 26.7% Medium Correlation: 36.7% Low Correlation: 20% No Correlation: 16.6%

**CHEMISTRY PRACTICAL FOR PHYSICAL SCIENCES - I
UCHR302**

Semester : III
Category : Allied Practical
Class & Major: II B.Sc., Physics

Credit : 02
Hours/week: 03
Total Hours: 39

Course Objectives:

CO	To enable the students to
CO1	Understand the estimation by the volumetric analysis
CO2	Explain the basic preparation of solutions.
CO3	Determine the complexometric analysis methods
CO4	Principles and practical experience of volumetric analysis
CO5	Analyze the experiment results using the estimation method.

VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
3. Estimation of ferrous sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of potassium permanganate using standard sodium hydroxide.
6. Estimation of magnesium using EDTA.
7. Estimation of ferrous ion using diphenyl amine as indicator.

Text Books

- Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. (2012) Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi.
- Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. (2007) Vogel's Textbook of Practical Organic Chemistry, 5th ed.; Pearson: India.

Reference Books

- Thomas, A.O. (2005). Practical Chemistry, Scientific Book Center, Cannanore Kerala.
- Vogel's . (2009). Text Book of Practical Organic Chemistry. Longman. London.
- Manna, A.K. (2018) Practical Organic Chemistry, Books and Allied: India.

COURSE OUTCOME:

CO	On completion of the course, the students will be able to	Bloom's level
CO-1	Gain the knowledge about the use of standard flask, volumetric pipettes, and burette.	K1, K2
CO-2	Carry out the results of volumetric titration.	K3
CO-3	Apply their skill in the analysis of water hardness.	K4
CO-4	Analyze the chemical constituents in the chemical products.	K5
CO-5	Interpret of experimental results of using Mohr's salt for the estimation of ferrous sulphate.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	1	1	0	0
CO2	3	3	2	1	0	0
CO3	3	3	2	1	1	0
CO4	3	2	2	2	1	1
CO5	3	2	2	2	2	2

High Correlation: 23.3% Medium Correlation: 36.7% Low Correlation: 23.3% No Correlation: 16.7%

GENERAL CHEMISTRY – IV
UCHM409

Semester : IV
Category : Core VII/DSC-VII
Class & Major : II B.Sc., Chemistry

Credit : 04
Hours/Week : 05
Total Hours : 65

Course Objectives:

CO No.	To enable the students to
CO1	Relate the thermodynamic concepts on chemical processes and applied aspects.
CO2	Understand the concepts of first and second law of thermodynamics.
CO3	Categorize the carboxylic acids and their derivatives.
CO4	Classify the aldehydes, ketones and their general methods for preparation and physical properties.
CO5	Calculate the q, w, E and H for reversible, irreversible expansion of ideal and real gases.

UNIT I Thermodynamics I**12 Hours**

Terminology – Intensive, extensive variables, state, path functions; isolated, closed and open systems; isothermal, adiabatic, isobaric, isochoric, cyclic, reversible and irreversible processes; First law of thermodynamics – Concept and significance of heat (q), work (w), internal energy (E),

enthalpy (H); calculations of q, w, E and H for reversible, irreversible expansion of ideal and real gases under isothermal and adiabatic conditions; relation between heat capacities (C_p & C_v); Thermochemistry - heats of reactions, standard states; types of heats of reactions and their applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications;

UNIT II Thermodynamics II

14 Hours

Second Law of thermodynamics - Limitations of first law, spontaneity and randomness; Carnot's cycle; Concept of entropy, entropy change for reversible and irreversible processes, entropy of mixing, calculation of entropy changes of an ideal gas and a van der Waals gas with changes in temperature, volume and pressure, entropy and disorder. Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs- Helmholtz equation - derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases.

UNIT III General Characteristics of d-block elements

11 Hours

Transition Elements- Electronic configuration - General periodic trend variable valency, oxidation states, stability of oxidation states, color, magnetic properties, catalytic properties and tendency to form complexes. Comparative study of transition elements and non-transition elements - comparison of II and III transition series with I transition series. Group study of Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel and Zinc groups.

UNIT IV

13 Hours

Ethers, Thio ethers and Epoxides - Nomenclature, structure, preparation, properties and uses.

Aldehydes and Ketones: Nomenclature, structure and reactivity of aliphatic and aromatic aldehydes and ketones; general methods of preparation and physical properties. Nucleophilic addition reactions, base catalysed reactions with mechanism Aldol, Cannizzaro's reaction, Perkin reaction, Benzoin condensation, Haloform reaction, Knoevenagel reaction. Oxidation of aldehydes. Baeyer - Villiger oxidation of ketones. Reduction: Clemmensen reduction, Wolf - Kishner reduction, Meerwein - Ponnordorf Verley reduction, reduction with LiAlH_4 and NaBH_4 .

UNIT V

15 Hours

Carboxylic Acids: Nomenclature, structure, preparation and reactions of aliphatic and aromatic mono carboxylic acids. Physical properties, acidic nature, effect of substituent on acidic strength.

HVZ reaction, Claisen ester condensation, Bouveault Blanc reduction, decarboxylation, Huns – diecker reaction. Reactions of dicarboxylic acids (Oxalic acid, Malonic acid, succinic acid, glutaric acid, adipic acid)

Carboxylic acid Derivatives: Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide, anhydride, ester, amide. Schottan Baumann reaction. Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement.

Active methylene compounds: Keto – enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

Text Books

- B.R. Puri and L.R. Sharma (2008), *Principles of Physical Chemistry*, Shoban Lal Nagin Chand and Co., thirty three edition.
- K. L. Kapoor (2009), *A Textbook of Physical chemistry*, (volume-2 and 3), Macmillan, India Ltd, third edition.

Reference Books

- Maron, S. H. and Prutton C. P. (1972) *Principles of Physical Chemistry*, 4thed.; The Macmillan Company: Newyork.
- Lee, J. D. (1991) *Concise Inorganic Chemistry*, 4th ed.; ELBS William Heinemann: London.
- Gurudeep Raj, (2001), *Advanced Inorganic Chemistry*, 26thed.; Goel Publishing House: Meerut.
- Atkins, P.W. & Paula, J. (2014) *Physical Chemistry*, 10th ed.; Oxford University Press: New York.

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Outline of the Ethers, Thio ethers and Epoxides' of Nomenclature and structures.	K1, K2
CO2	Classify the reduction reaction of Aldehydes and ketones with LiAlH ₄ and NaBH ₄ .	K3
CO3	Apply the Nucleophilic addition reaction for Cannizzaro's reaction, Perkin reaction, etc.,	K4
CO4	Discuss the various laws of thermodynamics and thermos-chemical calculations.	K5
CO5	Investigate the chemistry of transition elements with respect to various periodic properties and group wise discussions.	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	0	0	0
CO2	3	2	2	1	1	0
CO3	3	2	2	2	1	1
CO4	3	3	2	2	2	2
CO5	3	3	3	2	2	2

High Correlation: 26.7% Medium Correlation: 43.3% Low Correlation : 16.7%
No Correlation:13.3%

PHYSICAL CHEMISTRY PRACTICAL – I
UCHR410

Semester : IV

Credit : 03

Category : Core Practical VIII/DSC-VIII

Hours/Week: 03

Class &Major: II B.Sc., Chemistry

Total Hours : 39

Course Objectives:

CO No.	To enable students to
CO1	The laboratory experiments in order to understand the concepts of physical changes in chemistry
CO2	Calculate the rates of chemical reactions
CO3	Acquire the knowledge about the colligative properties in physical science.
CO4	Recall the importance of Polarimetry.
CO5	Detecting the conductivity methods using electrochemistry.

UNIT-I Chemical kinetics**13 Hours**

1. Determination of rate constant of acid catalysed hydrolysis of an ester (methyl acetate).
 2. Determination of order of reaction between iodide and persulphate (initial rate method).
 3. Polarimetry: Determination of rate constant of acid catalysed inversion of cane sugar
- Thermochemistry
4. Determination of heat of neutralisation of a strong acid by a strong base.
 5. Determination of heat of hydration of copper sulphate.

UNIT II Electrochemistry – Conductance measurements**13 Hours**

6. Determination of cell constant
7. Determination of molar conductance of strong electrolyte
8. Determination of dissociation constant of acetic acid Colorimetry

9. Determination of concentration of copper sulphate solution

UNIT III Colligative property

13 Hours

10. Determination of molecular weight of an organic compound by Rast method using naphthalene or diphenyl as solvent Adsorption

11. Construction of Freundlich isotherm for the adsorption of acetic acid on activated charcoal

TEXT BOOKS

- Levitt, B.P. (2018) *Findlay's Practical Physical Chemistry* (9th Ed.). London: Longman.
- Gurtu, J. N., & Kapoor, R. (2011). *Advanced Experimental Chemistry* (Vol. I). New Delhi: S. Chand & Co.

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Understand the laboratory skills for safe handling of the equipment and chemicals	K1, K2
CO2	Explain the procedure, data and methodology for the practical work	K3
CO3	Apply the principles of electrochemistry, kinetics for carrying out the practical work	K4
CO4	Construct the Freundlich isotherm for the adsorption of acetic acid on activated charcoal.	K5
CO5	Demonstrate the Colligative properties by Rast method using diphenyl as solvent adsorption.	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	1	0
CO2	3	2	3	3	1	1
CO3	3	2	3	3	2	1
CO4	3	3	3	2	2	1
CO5	3	3	3	2	2	2

High Correlation : 43.3% Medium Correlation: 33.3% Low Correlation : 20 %

No Correlation : 3.4%

FORENSIC SCIENCE UCHD401

Semester : IV
Category : SEC VII/DS III
Class & Major: II B.Sc., Chemistry

Credit : 02
Hours/Week: 02
Total Hours : 26

Course Objectives:

CO	To enable the students to
CO1	Identify the crime detection through analytical instruments.

CO2	Uses of neutron activation analysis in detecting arsenic in human hair.
CO3	Apply the medical aspects involved in forensic science.
CO4	Detect the gold-plated jewels and authenticity of diamond.
CO5	Justify the burning characteristics and chemistry of combustible materials.

UNIT I Poisons

5 Hours

Poisons - types and classification - diagnosis of poisons in the living and the dead - clinical symptoms - postmortem appearances. Heavy metal contamination (Hg, Pb, Cd) of sea foods - use of neutron activation analysis in detecting arsenic in human hair. Treatment in cases of poisoning – use of antidotes for common poisons.

Unit-II Crime Detection

5 Hours

Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - Possible explosives (gelatin sticks and RDX) - metal detector devices and other security measures for VVIP-composition of bullets and detecting powder burns.

UNIT-III Forgery and Counterfeiting

6 Hours

Documents - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery methods - writing deliberately modified - uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS to detect counterfeit coins – detection of gold purity in 22 carat ornaments – detecting gold plated jewels - authenticity of diamond.

UNIT-IV Tracks and Traces

5 Hours

Tracks and traces - small tracks and police dogs - foot prints - costing of 16 foot prints -residue prints, walking pattern or tyre marks – miscellaneous traces and tracks – glass fracture - tool marks- paints - fibres - Analysis of biological substances - blood, semen, saliva, urine and hair - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and racehorses.

UNIT-V Medical Aspects

5 Hours

Aids - causes and prevention - misuse of scheduled drugs - burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson -natural fires and arson - burning characteristics and chemistry of combustible materials -nature of combustion. Ballistics - classification - internal and terminal ballistics - small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.

Text Books

- S.A Iqbal, M Liviu (2021), *Textbook of forensic chemistry*, Discovery publishing house private limited.
- Kelly M. Elkins (2019), *Introduction to Forensic Chemistry*, CRC Press, Taylor & Francis Group.

Reference Books

- Richard Saferst in and Criminalistics (2003)-*An Introduction to Forensic Science* (College Version), Saperstein, Printice hall, eighth edition,
- Suzanne Bell (2014), *Forensic Chemistry*, Pearson, second international edition.
- Jay Siegel (2015), *Forensic chemistry: Fundamentals and applications*, Wiley-Blackwell, first edition.
- Max M. Houck & Jay A. Segal, (2006) *Fundamentals of Forensic Science*, Elsevier Academic press.
- Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) *Henry Lee's Crime Scene Book* Elsevier Academic press.

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO1	Describe an idea about how to tracks and trace using police dogs, foot prints identification.	K1, K2
CO2	Infer the awareness on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bullets and detecting powder burns.	K3
CO3	Detection of the forgery documents, different types of forged signatures	K4
CO4	Prioritize to analyzing biological substances - blood, semen, saliva, urine and hair - DNA Finger printing for tissue identification in dismembered bodies.	K5
CO5	Role play of the medical aspects such as misuse of scheduled drugs and also have an exposure of handling fire explodes.	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	1	0
CO2	3	2	2	2	2	2
CO3	3	2	2	3	2	1
CO4	3	2	2	3	3	2
CO5	3	2	2	3	3	2

High Correlation: 36.7% Medium Correlation: 50% Low Correlation : 10% No Correlation:3.3%

CHEMISTRY FOR PHYSICAL SCIENCE – II
UCHA401

Semester : IV
Category : Allied
Class & Major : II B.Sc., Physics

Credit : 03
Hours/Week : 04
Total Hours : 52

Course Objectives:

CO No.	To enable the students to
CO1	Understand the co-ordination Chemistry and their applications in qualitative and quantitative analysis.
CO2	Outline the fundamentals of water technology with the purification techniques BOD, COD.
CO3	Define the Werner's and Pauling's theory with EAN rule.
CO4	Classify the types of luminescence with examples.
CO5	Determine the pH using the colorimetric method.

UNIT I-Co-ordination Chemistry and Water Technology

11 Hours

Co-ordination Chemistry: Definition of terms- IUPAC Nomenclature - Werner's theory - EAN rule - Pauling's theory – Postulates - Applications to $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Co}(\text{CN})_6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis.

Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques BOD, COD.

UNIT II Carbohydrates and Amino acids

10 Hours

Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose –fructose interconversion. Properties of starch and cellulose. Amino acids: Classification- preparation and properties of alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).

UNIT III-Electrochemistry

11 Hours

Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials - electrochemical series. Strong and weak electrolytes - ionic product of water-pH, pK_a , pK_b . Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells- corrosion and its prevention.

UNIT IV-Kinetics and Catalysis

10 Hours

Order and molecularity. Integrated rate expression for I and II (2A \rightarrow Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction Half-life period. Catalysis - homogeneous and heterogeneous, catalyst used in Contact and Haber's processes. Concept of energy of activation and Arrhenius equation.

UNIT V-Photochemistry**10 Hours**

Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).

Text Books

- V.Veeraiyan, (2009.) *Textbook of Ancillary Chemistry*; High mount publishing house, Chennai, first edition.
- S.Vaithyanathan (2006), *Text book of Ancillary Chemistry*; Priya Publications, Karur.

Reference book

- P.L.Soni, Mohan Katyal, (2007) *Text book of Inorganic chemistry*; Sultan Chand and Company, NewDelhi, twentieth edition.
- R.Puri, L.R.Sharma, M.S.Pathania, (2018) *Text book Physical Chemistry*; Vishal Publishing Co., NewDelhi, forty seventh edition
- B.K,Sharma, (2014) *Industrial Chemistry*; GOEL publishing house, Meerut, sixteenth edition,

Course Outcome:

Co No.	On completion of the course, the students will be able to	Bloom's level
CO1	Write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology	K1, K2
CO2	Explain the preparation and property of carbohydrate, amino acids and nucleic acids.	K3
CO3	Apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.	K4
CO4	Identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst.	K5
CO5	Evaluate the various type of photochemical process.	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	0	0
CO2	3	3	2	2	1	1
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	1
CO5	3	3	2	2	2	2

High Correlation : 40% Medium Correlation: 40% Low Correlation : 13.3% No Correlation : 6.7%

CHEMISTRY PRACTICAL FOR PHYSICAL SCIENCES - II**UCHR402**

Semester : IV
Category : Allied Practical
Class & Major: II B.Sc., Physics

Credit : 02
Hours/ week : 03
Total Hours : 39

Course Objectives:

CO No.	To enable the students to
CO1	Identification of organic functional groups.
CO2	Acquire the different types of organic compounds with respect to their properties
CO3	Determination of elements in organic compounds.
CO4	Distinguish between the aliphatic and aromatic compounds
CO5	Understand the functional group tests of mono & di amides.

SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS

The analysis must be carried out as follows:

- Detection of elements (N, S, Halogens).
- Distinguish between aliphatic and aromatic compounds.
- Distinguish – Saturated and unsaturated compounds.
- Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose].

Text Books

- V.Venkateswaran, R.Veerasingam, A.R.Kulandaivelu, (2011) *Basic Principles of Practical Chemistry*; Sultan Chand & sons, Second edition.

Course outcome:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recite the composition of various organic compounds.	K1, K2
CO-2	Relate and carry out the record and interpret the results of volumetric titration.	K3
CO-3	Apply their skill in the analysis of organic elements.	K4
CO-4	Analyse the chemical constituents in the functional group tests.	K5
CO-5	Distinguish between the saturated and unsaturated compounds	K6

Course Mapping:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	1	0
CO2	3	2	2	2	2	2
CO3	3	2	2	3	2	1
CO4	3	2	2	3	3	2
CO5	3	2	2	3	3	2

High Correlation : 36.7% Medium Correlation: 50% Low Correlation : 10%

No Correlation : 3.3%

III and IV Evaluation Component

Semester	Course code	Course title	Component III	Component IV
III	UCHM309	General Chemistry - III	Seminar	Modal Preparation
III	UCHU302	Entrepreneurial Skills in Chemistry	Case Study	Assignment
III	UCHD301	Pesticide Chemistry	Group discussion	Chart Preparation
III	UPHA301	Chemistry for Physical sciences- I	Seminar	Assignment
IV	UCHM409	General chemistry- IV	Seminar	Aptitude test
IV	UCHD401	Forensic Science	Chart Preparation	Assignment
IV	UPHA401	Chemistry for Physical sciences - II	Seminar	Chart Preparation

PG PROGRAMME – M.Sc., CHEMISTRY

PREAMBLE

PG: Syllabi of Programme offered in Semester III and IV along with III and IV Evaluation Components (with Effect from 2023 – 2025 Batch onwards).

PROGRAMME SPECIFIC OUTCOME

PSO No.	Upon completion of these courses the students will be able to
PSO 1	Understand the specialized chemical reactions and their mechanisms to design new synthetic pathway.
PSO 2	Design and synthesize new compounds, which have potential applications in Industry and Medicine.
PSO 3	Carry out experiments and analysis in the area of organic analysis, estimation, separation, inorganic semi micro analysis.
PSO4	Acquire to synthesize, separate and characterize compounds using laboratory and instrumentation techniques.
PSO 5	Build new research oriented skills to maintain their competence and to allow them to contribute to the advancement of knowledge.
PSO 6	Adopt to qualify in competitive exams and developed theoretical and become successful career in chemistry.

COURSE PROFILE M. Sc. Chemistry

Sem	Category	Course Code	Course Title	Contact Hrs /Week	Credits
I	Core Course-I	PCHM117	Organic Reaction Mechanism-I	5	4
	Core Course-II	PCHM118	Structure And Bonding In Inorganic Compounds	5	4
	Core Course Practical-III	PCHR121	Organic Chemistry Practical	5	4
	Elective Core-I	PCHO119	Nanomaterials and Nanotechnology	5	3
	Elective Core -II	PCHO120	Molecular Spectroscopy	5	3
	Skill Enhancement Course/NME			3	2
	Online Course	PONL101	-	2	2
	Total			30	22
	Core Course -IV	PCHM210	Organic reaction mechanism-II	5	4
	Core Course -V	PCHM211	Physical Chemistry-I	5	4
	Core Course	PCHR214	Inorganic Chemistry Practical	5	4

		Practical-VI				
		Core Industry Module	PCHM212	Chemistry In Agriculture	4	3
		Elective Course - III	PCHO212	Green Chemistry	4	3
		Elective Course - IV	PCHO213	Material Science	4	3
		Skill Enhancement Course (Discipline Specific)	PCHD201	Chemistry in consumer product	3	2
		Service Learning	PCHX201	Vermicomposting	-	1
		Internship/Industrial Training/Field Visit	PINS201			2
		Total			30	26
III		Core Course -VII	PCHM304	Organic synthesis and Photochemistry	5	4
		Core Course - VIII	PCHM305	Coordination Chemistry-I	5	4
		Core Course Practical –IX	PCHR307	Physical Chemistry Practical	5	4
		Core Industry Module	PCHM308	Industrial Chemistry	4	3
		Elective Course - V	PCHO306	Pharmacognosy and Phytochemistry	4	3
		Elective Course - VI	PCHO307	Chemistry in food Preservation	3	3
		SEC (Inter Disciplinary)	PCHI302	Characterization of Materials	4	2
		Total			30	23
IV		Core Course -X	PCHM415	Coordination Chemistry-II	5	4
		Core Course -XI	PCHM416	Physical Chemistry-II	5	4
		Core Course -XII	PCHR417	Analytical Instrumentation technique Practical	5	4
		Core Project - XIII	PCHP401	Project with viva voce	6	4
		Elective Course - VI	PCHO418	Polymer Chemistry	5	3
		SEC(Professional skill)	PCHD401	Professional Competency	4	2
		Internship	PINS401			2
		Total			30	23
		Total			120	94

ORGANIC SYNTHESIS AND PHOTOCHEMISTRY
PCHM304

Semester : III
Category : Core VII
Class & Major: II M.Sc., Chemistry

Credit : 04
Hours / Week : 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Understand the molecular complexity of carbon skeletons and the presence of functional groups and their relative positions.
CO-2	Study various synthetically important reagents for any successful organic synthesis.
CO-3	Apply disconnection approach and identifying suitable synthons to effect successful organic synthesis.
CO-4	Learn the concepts of pericyclic reaction mechanisms.
CO-5	Gain the knowledge of photochemical organic reactions.

UNIT-I: Heterocyclic Compound with Two or More Heteroatoms: 12 Hours

Five membered heterocyclic compounds with two heteroatom: Preparation and properties (chemical and physical) of pyrazoles, imidazoles, isoxazoles, oxazoles, isothiazoles and thiazoles and their substitution reactions.

Six membered heterocyclic compounds with two or more heteroatoms. Preparation of pyridazine, pyrimidine, pyrazine, oxazine, thiazine and dioxane, and their substitution reactions. Structure and reactivity of 1,2- and 1,4- and 1,3 diazines, triazines, tetrazines, oxadiazines and oxathiazines.

UNIT-II: Organic Synthetic Methodology 13 Hours

Retrosynthetic analysis; Alternate synthetic routes synthesis of organic mono and bi-functional compounds via disconnection approach. Key intermediates available starting materials and resulting yields of alternative methods. Convergent and divergent synthesis, Synthesis based on umpolung concepts of Seebach. Protection of hydroxyl, carboxyl, carbonyl, thiol and amino groups. Illustration of protection and deprotection in synthesis. Use of protective groups, activating groups, and bridging elements.

UNIT-III: Pericyclic Reactions: 13 Hours

Pericyclic Reactions: Molecular orbital symmetry, Frontier orbitals of ethylene, 1, 3-butadiene, 1, 3, 5- hexatriene. Classification of pericyclic reactions. Electrocyclic reactions – $4n$ and $4n+2$ systems, Woodward –Hoffmann rules, Correlation diagram, FMO and PMO approach [1, 3-dienes and 1, 3, 5-trienes]. Cycloadditions: Antarafacial and suprafacial additions, $4n$ and $4n+2$ systems, 1, 3- dipolar addition, Diel's Alder reaction. Sigmatropic Rearrangements: Suprafacial and antarafacial shifts of hydrogen, Cope and Claisen rearrangement.

UNIT-IV: Organic Photochemistry-I**14 Hours**

Introductory theory of light absorption, photophysical processes- Jablonski diagram, IC, ISC, fluorescence, phosphorescence, Stern Volmer equation. Photochemical reactions of Ketones – Norrish type I and II, Reaction of conjugated cyclohexadienone to 3,4-diphenyl phenols; Barton's reactions.

UNIT-V: Organic Photochemistry-II:**13 Hours**

Photoreduction of Ketones, Photochemistry of α , β unsaturated ketones, Photochemical reactions of olefins – Cis-trans isomerism, Dimerization reactions, photochemistry of butadiene, Photochemistry of aromatic compounds and photooxidation, Photo cycloadditions Di-Pi methane rearrangement.

Text Books

- F. A. Carey and Sundberg, (2003) *Advanced Organic Chemistry*, 5th ed, Tata McGraw-Hill, New York.
- Clayden, Greeves, Warren, (2016) *Organic Chemistry*, Oxford University Press, Second Edition.

Reference Books

- Gill and Wills (1974), *Pericyclic Reactions*, Chapman Hall, London.
- J.A. Joule, G.F. Smith (2004) *Heterocyclic Chemistry*, Garden City Press, Great Britain.
- W. Caruthers, (2007) *Some Modern Methods of Organic Synthesis* 4thedn, Cambridge University Press, Cambridge
- H. O. House (1972). *Modern Synthetic reactions*, W.A. Benjamin Inc.
- Jagdamba Singh and Jaya Singh, (2012) *Photochemistry and Pericyclic Reactions*, New Age International Publishers, New Delhi.

Website and e-learning source

- <https://rushim.ru/books/praktikum/Monson.pdf>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall the basic principles of organic chemistry and to understand the various reactions of organic compounds with reaction mechanisms.	K1, K2
CO-2	Identify the versatility of various special reagents and to correlate their reactivity with various reaction conditions.	K3
CO-3	Implement the synthetic strategies in the preparation of various organic compounds.	K4
CO-4	Predict the suitability of reaction conditions in the preparation of tailor-made organic compounds.	K5
CO-5	Design and synthesize novel organic compounds with the methodologies learnt during the course.	K6

COURSE MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	1	1
CO2	3	3	3	2	2	1
CO3	3	3	3	2	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 63.3%; Medium Correlation: 26.7%; Low Correlation : 10%.

COORDINATION CHEMISTRY – I PCHM305

Semester : III

Credit : 04

Category : Core VIII

Hours / Week : 05

Class & Major: II M.Sc., Chemistry

Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Gain insights into the modern theories of bonding in coordination compounds.
CO-2	Learn various methods to determine the stability constants of complexes.
CO-3	Understand and construct correlation diagrams and predict the electronic transitions that are taking place in the complexes.
CO-4	Describe various substitution and electron transfer mechanistic pathways of reactions in complexes.
CO-5	Evaluate the reactions of octahedral and square planar complexes.

UNIT-I: Modern theories of coordination compounds:

12 Hours

Crystal field theory - splitting of d orbitals in octahedral, tetrahedral and square planar symmetries - measurement of $10Dq$ - factors affecting $10Dq$ - spectrochemical series - crystal field stabilisation energy for high spin and low spin complexes- evidences for crystal field splitting - site selections in spinels and antispinel - Jahn Teller distortions and its consequences. Molecular Orbital Theory and energy level diagrams concept of Weak and strong fields, Sigma and pi bonding in octahedral, square planar and tetrahedral complexes.

UNIT-II: Spectral characteristics of complexes:

12 Hours

Term states for d ions - characteristics of d-d transitions - charge transfer spectra - selection rules for electronic spectra - Orgel correlation diagrams - Sugano-Tanabe energy level diagrams - nephelauxetic series - Racah parameter and calculation of inter-electronic repulsion parameter.

UNIT-III: Stability and Magnetic property of the complexes:**15 Hours**

Stability of complexes: Factors affecting stability of complexes, Thermodynamic aspects of complex formation, Stepwise and overall formation constants, Stability correlations, statistical factors and chelate effect, Determination of stability constant and composition of the complexes: Formation curves and Bjerrum's half method, Potentiometric method, Spectrophotometric method, Ion exchange method. Magnetic property of complexes: Spin-orbit coupling, effect of spin-orbit coupling on magnetic moments, quenching of orbital magnetic moments.

UNIT-IV: Kinetics and mechanisms of substitution reactions of octahedral and square planar complexes:**15 Hours**

Inert and Labile complexes; Associative, Dissociative and SN₁CB mechanistic pathways for substitution reactions; acid and base hydrolysis of octahedral complexes; Classification of metal ions based on the rate of water replacement reaction and their correlation to Crystal Field Activation Energy; Substitution reactions in square planar complexes: Trans effect, theories of trans effect and applications of trans effect in synthesis of square planar compounds.

UNIT-V: Electron Transfer reactions in complexes**11 Hours**

Electron Transfer reactions in octahedral complexes: Outer sphere electron transfer reactions and Marcus-Hush theory; inner sphere electron transfer reactions; nature of the bridging ligand in inner sphere electron transfer reactions. Photo-redox, photo-substitution and photo-isomerisation reactions in complexes and their applications.

Text Books

- J E Huheey, EA Keiter, RL Keiter and OK Medhi, (2006) *Inorganic Chemistry – Principles of structure and reactivity*, 4th Edition, Pearson Education Inc.
- F. A. Cotton, G. Wilkinson.; C. A. Murillo; M. Bochmann, (2012) *Advanced Inorganic Chemistry*, 6th ed.; Wiley Inter-science: New York.

Reference Books

- Keith F. Purcell and John C. Kotz, (2013) *Inorganic Chemistry*, Saunders Publications, USA,.
- Peter Atkins and Tina Overton, Shriver and Atkins' *Inorganic Chemistry*, 5th Edition, Oxford University Press,
- F. A. Cotton, G. Wilkinson, (2012) *P. L. Guas, Basic Inorganic Chemistry*, John Wiley, 3rd edn.

- B. Douglas, D. McDaniel, J. Alexander, John Wiley, (2009), *Concepts and Models of Inorganic Chemistry*, 3rd edition.

Website and e-learning source

<https://ocw.mit.edu/courses/5-04-principles-of-inorganic-chemistry-ii-fall-2008/pages/syllabus/>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand and comprehend various theories of coordination compounds.	K1, K2
CO-2	Classify the spectroscopic and magnetic properties of coordination complexes.	K3
CO-3	Explain the stability of complexes and various experimental methods to determine the stability of complexes.	K4
CO-4	Predict the electronic transitions in a complex based on correlation diagrams and UV-visible spectral details.	K5
CO-5	Comprehend the kinetics and mechanism of substitution reactions in octahedral and square planar complexes.	K6

COURSE MAPPING:

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	2	1	1
CO2	3	3	3	3	2	1
CO3	3	3	3	3	2	1
CO4	3	3	3	2	2	2
CO5	3	3	3	3	3	3

High Correlation : 63.3%; Medium Correlation: 23.3%; Low Correlation : 13.4%.

PHYSICAL CHEMISTRY PRACTICAL PCHR307

Semester : III
Category : Core IX
Class & Major : II M.Sc., Chemistry

Credit : 04
Hours / Week: 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Understand the principle of conductivity experiments through conductometric titrations.
CO-2	Evaluate the order of the reaction, temperature coefficient, and activation energy of the reaction by following pseudo first order kinetics.
CO-3	Construct the phase diagram of two component system forming congruent melting solid and find its eutectic temperatures and compositions.
CO-4	Determine the kinetics of adsorption of oxalic acid on charcoal.

CO-5	Develop the potential energy diagram of hydrogen ion, charge density distribution and Maxwell's speed distribution by computational calculation.
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UNIT-I: Conductivity Experiments (Any Four Experiments)

1. Determination of equivalent conductance of a strong electrolyte & the verification of DHO equation.
2. Verification of Ostwald's Dilution Law & Determination of pKa of a weak acid.
3. Verification of Kohlrausch's Law for weak electrolytes.
4. Determination of solubility of a sparingly soluble salt.
5. Acid-base titration (strong acid and weak acid vs NaOH).
6. Precipitation titrations (mixture of halides only).

UNIT-II: Kinetics

1. Study the kinetics of acid hydrolysis of an ester, determine the temperature coefficient and also the activation energy of the reaction.
2. Study the kinetics of the reaction between acetone and iodine in acidic medium by half-life method and determine the order with respect to iodine and acetone.

UNIT-III: Phase diagram

Construction of phase diagram for a simple binary system

1. Naphthalene-meta dinitrobenzene
2. Meta dinitrobenzene - diphenyl amine

TEXT BOOKS

- Levitt, B.P. (2011) *Findlay's Practical Physical Chemistry* (9th Ed.). London: Longman.
- Gurtu, J. N., & Kapoor, R. (2019). *Advanced Experimental Chemistry* (Vol. I). New Delhi: S. Chand & Co.

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall the principles associated with various physical chemistry experiments.	K1, K2
CO-2	Relate the term Ostwald's Dilution Law & Determination of pKa of a weak acid.	K3
CO-3	Observe and record systematically the readings in all the experiments.	K4
CO-4	Calculate and process the experimentally measured values and compare with graphical data.	K5
CO-5	Interpret the experimental data scientifically to improve students' efficiency for societal developments.	K6

COURSE MAPPING:

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	2	2	1	1
CO2	3	3	3	3	2	1
CO3	3	3	3	3	2	1
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 70%; Medium Correlation: 16.7%; Low Correlation : 13.3%.

INDUSTRIAL CHEMISTRY**PCHR308**

Semester : III

Credit : 03

Category : Core Industry module

Hours / Week : 04

Class & Major : II M.Sc., Chemistry

Total Hours : 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Gain knowledge about the principles of industrial fuels.
CO-2	Understand the importance of leather and water industry.
CO-3	Study about small scale industries.
CO-4	Learn the importance of cement and glass industries.
CO-5	Recite the principles of sugar and paper industry.

UNIT-I: Industrial fuels**11 Hours**

Sources: non-renewable-classification of fuels – solid liquid and gaseous Calorific values of fuels and its determination. Solid fuels: coal-types, properties and uses-lignite-and anthracite-definition and uses. Liquid fuels: Refining of crude petroleum and uses of fractions-Cracking- Octane number. Gaseous fuels: Natural gas and gobar gas – production – composition and uses.

UNIT-II: Leather Industry and Water Industry**10 Hours**

Leather Industry: Curing- preservation and tanning of hides and skins- Process of dehairing and dyeing - Treatment of tannery effluents. Water Industry: Pollution of water by fertilizers, pesticides and industrial wastes -BOD-COD-thermal pollution. Reverse osmosis- softening of hard water.

UNIT-III: Small Scale Chemical Industries**10 Hours**

Electro thermal and electrochemical industries: electroplating - surface coating industries - oils, fats and waxes. Match industries and fireworks manufacture of some industrially important chemicals like potassium chlorate- and red phosphorus.

UNIT-IV: Cement, Ceramics, Glass**10 Hours**

Cement: Manufacture - Wet Process and Dry process. Types- Analysis of major constituents- setting of cement- reinforced concrete. Cement industries in India. Ceramics: Important clays – glazing and verification. Glass: Types, Composition, manufacture of Optical glass, colored glasses, lead glass and neutron absorbing glass.

UNIT-V: Sugar and Paper industry**11 Hours**

Sugar industry: Double sulphitation process, refining, and grading of sugar. Saccharin: synthesis and uses as a sugar substitute. Ethanol: manufacture from molasses by fermentation. Sugar industries in India. Paper industry: Manufacture of paper: production of sulphite pulp and conversion to paper (bleaching, filling, sizing and calendaring).

Text Books

- Biswas, A. K. (2017). *Frontiers in Applied Chemistry*. Narosa publishing house.
- Vermain, O. P & Narula, A. C. (2014). *Applied chemistry theory and books*. National Publishers.

Reference Book

- Shreve, R. N., & Brink, J. A. (2019). *Chemical Process Industries* (4th edn.). Tokyo: McGraw Hill.
- Chakrabarty, N. (1981). *Industrial Chemistry*. New Delhi: Oxford & Publishing Co.
- Singh, P. P., Joseph, T. M., & Dhavale, R. G. (2001). *College Industrial Chemistry* (4th edn.). Bombay: Himalaya Publishing House.

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the basic concept of solid, liquid and gas fuels.	K1, K2
CO-2	Acquire knowledge about the Electro-thermal and electrochemical industries.	K3
CO-3	Analysis the manufacturing of Cement by wet & dry process.	K4
CO-4	Correlate the cognizance of the Sugar and paper industry.	K5
CO-5	Evaluate the preservation and tanning of hides and skins of leather industry.	K6

COURSE MAPPING:

	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	2	1	1
CO2	3	3	3	3	2	1
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation : 70%; Medium Correlation: 20%; Low Correlation : 10%.

PHARMOCOGNOSY AND PHYTOCHEMISTRY
PCHE306

Semester : III
Category : Elective-V
Class & Major: II M.Sc., Chemistry

Credit : 03
Hours / Week : 04
Total Hours : 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Illustrate the knowledge of natural products, biological functions and pharmacological uses.
CO-2	Develop knowledge on primary and secondary metabolites and their sources.
CO-3	Understand the concepts of isolation methods and separation of bioactive compounds.
CO-4	Provide the knowledge on selected glycosides and marine drugs.
CO-5	Familiarize the guidelines of WHO and different sampling techniques.

UNIT-I: Pharmacognosy and Standardization of Herbal drugs:

11 Hours

Introduction, definition, development classification and Source of Drugs: Biological, mineral, marine and plant tissue cultures. Study of pharmacognostic of a crude drug. Biosynthesis: Shikimic acid pathway and acetate pathway. Systematic analysis of Crude drugs. Standardization of Herbal drugs. WHO guidelines, Sampling of crude drug, Methods of drug evaluation. Determination of foreign matter, moisture Ash value. Phytochemical investigations-General chemical tests.

UNIT-II: Extraction Techniques:

10 Hours

General methods of extraction, types – maceration, Decoction, percolation, Immersion and soxhlet extraction. Advanced techniques- counter current, steam distillation, supercritical gases, sonication, Micro waves assisted extraction. Factors affecting the choice of extraction process.

UNIT-III: Drugs containing Terpenoids and volatile oils:

10 Hours

Terpenoids: Classification, Isoprene rule, Isolation and separation techniques, General properties of Camphor, Menthol, Eucalyptol. Volatile Oils or Essential Oils: Method of Preparations, Structure, Classifications of Volatile oils, Camphor oil, Geranium oil, Citral. Pentacyclic triterpenoids: amyrienes; taraxasterol: Structure and pharmacological applications.

UNIT-IV: Drugs containing alkaloids:

10 Hours

Occurrence, function of alkaloids in plants, pharmaceutical applications. Isolation, Preliminary Qualitative tests and general properties. General methods of structural elucidation. Morphine, Reserpine, papaverine - chemical properties, structure and uses.

UNIT-V: Plant Glycosides and Marine drugs:**11 Hours**

Glycosides: Basic ring system, classification, isolation, properties, qualitative analysis. Pharmacological activity of Senna glycosides, Cardiac glycosides-Digoxin, digitoxin, Steroidal saponins glycosides- Diosgenin, hecogenin. Marine drugs -Selected Drug Molecules: Cardiovascular active substances, cytotoxic compounds, antimicrobial compounds, antibiotic compounds, Anti-inflammatory agents. Marine toxins.

Text Books

- Gurdeep R Chatwal (2016), *Organic chemistry of Natural products*, Volume I &II, 5th edition, Himalaya publishing House.
- S.V.Bhat, B.A. Nagasampagi, M.Sivakumar (2014), *Chemistry of Natural Products*, Revised edition, Narosa Publishers.

Reference Books

- Jeffrey B. Harborne (2012), *Phytochemical methods: A Guide to Modern Techniques of Plant Analysis*, 4th edition, Indian reprint, Springer.
- Ashutoshkar (2007), *Pharmacognosy and Pharmacobiotechnology*, 2nd edition, New age international (P) limited, New Delhi.

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall the sources of natural medicines and analysis of crude drugs.	K1, K2
CO-2	Understand the methods of evaluation based on various parameters.	K3
CO-3	Relate various techniques to discover new alternative medicines	K4
CO-4	Analyze the advanced techniques for the extraction process.	K5
CO-5	Evaluate the isolated drugs for various pharmacological activities.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	2	1	1
CO2	3	3	3	2	1	1
CO3	3	3	3	2	2	1
CO4	3	3	3	3	2	3
CO5	3	3	3	3	3	3

High Correlation : 63.3%; Medium Correlation: 20%; Low Correlation : 16.7%.

CHEMISTRY IN FOOD PRESERVATION

PCHO307

Semester : III
Category : Elective course-VI
Class & Major: II M.Sc., Chemistry
Course Objectives:

Credit : 03
Hours / Week : 03
Total Hours : 39

CO No.	To enable the students to
CO-1	Infer the importance of vitamins, minerals and proteins in food.
CO-2	Familiarize the chemical and functional properties of food processing and preservation
CO-3	Understand the concept of technology of color preservation.
CO-4	Prioritize the terms of flavors in foods.
CO-5	Design the feasible application in food industry.

UNIT I VITAMINS, MINERALS, AND PROTEINS

8 Hours

Fat soluble vitamins: Vitamin- A and pro vitamin- A, vitamin D and E- stability and mechanism of degradation. Major and Minor mineral constituents in food – Essential metals as nutrients, solubility of minerals. Acid- base theory; Lowry- Bronsted and Lewis theory; Chelate effect.

Unit II: PRESERVATIVES TECHNIQUES

8 Hours

Preservatives-Definition, classification and function in food processing and preservation. natural preservatives; chemical preservatives; acidulants – organic acids and esters; sulphur dioxide and its salts; nitrites; antibiotics; surface preservation; Permitted preservatives in foods .

Unit III COLOURS OF FOODS

8 Hours

Chlorophyll - influence of pH on processing; technology of color preservation - enzymic - metallo complex formation; carotenoids-occurrence-distribution. Betalains–structure–stability-effects of pH heat and light.

Unit IV: FOOD FLAVOURS

8 Hours

Flavoring agents – concept of flavors in foods; natural flavors; nature identical flavors; artificial flavoring substances. Biosynthesis of Food flavours -Fish food flavours; Biosynthesis of tomato flavor; thermally induced flavors Biosynthesis of tomato flavour.

Unit V: EMULSIFIERS, STABILIZERS

7 Hours

Emulsifiers and stabilizers - Definition; properties; HLB value; function of emulsifiers and stabilizers in foods; permitted emulsifiers and stabilizers used in foods; polyols – physical and chemical properties of polyols, application in food industry, permitted polyols in foods.

Text Books:

- Titus, M. Msagati, (2012) *The Chemistry of Food Additives and Preservatives*, John Wiley & Sons,.
- Jim Smith, Lily Hong-Shum (2011); *Food Additives Data Book*, John Wiley & Sons.

Reference Books:

- H.K. Chopra, P.S. Panesar, (2010); *Food Chemistry*. Narosa, Alpha Science International Ltd.
- Owen.R.Fennema, (2008); *Food Chemistry* 4th Edition, CRC Press.

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall to the understanding importance of vitamins, minerals and proteins.	K1, K2
CO-2	Classify and function in food processing and preservation.	K3
CO-3	Predict the technology of color preservation.	K4
CO-4	Apply the concept of nature identical flavors, artificial flavoring substances.	K5
CO-5	Design the properties of emulsifiers and stabilizers in foods.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	2	1	1
CO2	3	3	3	2	1	1
CO3	3	3	3	2	2	1
CO4	3	3	3	3	2	2
CO5	3	3	3	3	3	3

High Correlation : 60%; Medium Correlation: 23.3%; Low Correlation : 16.7%.

**CHARACTERIZATION OF MATERIALS
PCHI302/PPHD301**

Semester	: IV	Credit	: 2
Category	: Core XIV/Inter Disciplinary	Hours /Weeks	: 4
Class & Major	: II M.Sc., Chemistry/ Physics	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Recite some important thermal analysis techniques namely TGA, DTA, DSC and TMA.
CO-2	Understand the theory of image formation in an optical microscope and to introduce other specialized microscopic techniques.
CO-3	Analyze the principle of electron microscopes and scanning probe microscopes.
CO-4	Evaluate the electrical and optical characterization techniques for semiconducting materials.
CO-5	Compare and contrast the basics of x-ray diffraction techniques and some important spectroscopic techniques.

UNIT I: Thermal Analysis**10 Hours**

Introduction – Thermogravimetric analysis (TGA) – instrumentation – determination of weight loss and decomposition products – differential thermal analysis (DTA)- cooling curves – differential scanning calorimetry (DSC) – instrumentation – specific heat capacity measurements – determination of thermomechanical parameters.

UNIT II: Microscopic Methods**10 Hours**

Optical Microscopy: optical microscopy techniques – Bright field optical microscopy – Dark field optical microscopy – Dispersion staining microscopy - phase contrast microscopy –differential interference contrast microscopy - fluorescence microscopy - confocal microscopy - digital holographic microscopy - oil immersion objectives - quantitative metallography - image analyzer.

UNIT III: Electron Microscopy and Scanning Probe Microscopy**10 Hours**

SEM, EDAX, EPMA, and TEM: working principle and Instrumentation – sample preparation – Data collection, processing and analysis- Scanning tunneling microscopy (STEM) - Atomic force microscopy (AFM) - Scanning new field optical microscopy.

UNIT IV: Electrical Methods and Optical Characterisation**11 Hours**

Two probe and four probe methods- van der Pauw method – Hall probe and measurement – scattering mechanism – C-V characteristics – Schottky barrier capacitance – impurity concentration – electrochemical C-V profiling – limitations. Photoluminescence – light – matter interaction – instrumentation – electroluminescence – instrumentation – Applications.

UNIT V: X-Ray and Spectroscopic Methods**11 Hours**

Principles and instrumentation for UV-Vis-IR, FTIR spectroscopy, Raman spectroscopy, ESR, NMR, NQR, XPS, AES and SIMS-proton induced X-ray Emission spectroscopy (PIXE) – Rutherford Back Scattering (RBS) analysis-application - Powder diffraction - Powder diffractometer -interpretation of diffraction patterns - indexing - phase identification - residual stress analysis - Particle size, texture studies - X-ray fluorescence spectroscopy. Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS

- R. A. Stradling and P. C. Klipstain. (2017) *Growth and Characterization of semiconductors*. Adam Hilger, Bristol,.

- J. A. Belk. (2011) *Electron microscopy and microanalysis of crystalline materials*. Applied Science Publishers, London.

REFERENCE BOOKS

- B. D. Cullity, and R. S. Stock, (2001) *Elements of X-Ray Diffraction*, Prentice-Hall,.
- Murphy and B. Douglas, (2001). *Fundamentals of Light Microscopy and Electronic Imaging*, Wiley-Liss, Inc. USA,
- A. K. Tyagi, Roy, Mainak, Kulshreshtha, S. K., and S. Banerjee, (2009). *Advanced Techniques for Materials Characterization, Materials Science Foundations* (monograph series),
- W. W. Wendlandt, (1986). *Thermal Analysis*, John Wiley & Sons,
- J. B. Wachtman, Z. H. Kalman, (1993). *Characterization of Materials*, Butterworth Heinemann,

WEB SOURCES

- [https://cac.annauniv.edu/uddetails/udpg_2015/77.%20Mat%20Sci\(AC\).pdf](https://cac.annauniv.edu/uddetails/udpg_2015/77.%20Mat%20Sci(AC).pdf)
- <http://www.digimat.in/nptel/courses/video/113106034/L11.html>
- <https://nptel.ac.in/courses/104106122>
- <https://nptel.ac.in/courses/118104008>
- <https://www.sciencedirect.com/journal/materials-characterization>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's level
CO-1	Recall the TGA, DTA, DSC and TMA thermal analysis techniques and make interpretation of the results.	K1, K2
CO-2	Develop the concept of image formation in optical microscope, and their applications.	K3
CO-3	Analyze the functions about the operation of SEM, TEM, STM and AFM and their results.	K4
CO-4	Compare Hall measurement, four –probe resistivity measurement, C-V, I-V, Electrochemical, Photoluminescence and electroluminescence experimental techniques with necessary theory.	K5
CO-5	Compose the theory and experimental procedure for x- ray diffraction and some important spectroscopic techniques and their applications.	K6

COURSE MAPPING

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	3	2	3	3	3	3
CO-2	3	2	2	3	3	3
CO-3	3	2	3	3	3	3
CO-4	3	3	3	3	3	3
CO-5	3	2	3	3	3	3

Higher Correlation- 83.3%;

Medium Correlation- 16.7%;

COORDINATION CHEMISTRY-II
PCHM415

Semester : IV
Category : Core-X
Class & Major: II M.Sc., Chemistry

Credit : 04
Hours / Week : 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Recognize the fundamental concepts and structural aspects of organometallic compounds.
CO-2	Learn the reactions of organometallic compounds and their catalytic behaviour.
CO-3	Identify or predict the structure of coordination compounds using spectroscopic tools.
CO-4	Understand the structure and bonding in coordination complexes.
CO-5	Evaluate the spectral characteristics of selected complexes

UNIT-I: Chemistry of Organometallic Compounds

12 Hours

Classification of organometallic compounds based on M-C bond – 18 and 16 electron rule; Bonding in metal – olefin complexes (example: Ziese's salt), metal-acetylene and metal-allyl complexes; Metal-cyclopentadienyl complexes – Examples and MO approach to bonding in metallocenes; fluxional isomerism. Metal – carbonyl complexes: MO diagram of CO; Structure and bonding – bonding modes, MO approach of M-CO bonding, π -acceptor nature of carbonyl group, synergistic effect (stabilization of lower oxidation states of metals); Carbonyl clusters: Low nuclearity and high nuclearity carbonyl clusters – Structures based on polyhedral skeleton electron pair theory or Wade's rule.

UNIT-II: Reactions and Catalysis of Organometallic Compounds

12 Hours

Reactions of organometallic compounds: Oxidative addition, reductive elimination (α and β eliminations), migratory insertion reaction and metathesis reaction. Organo-metallic catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (oxo process), oxidation of olefin (Wacker process), olefin isomerisation, cyclo-oligomerisation of acetylenes using Reppe's catalysts, Monsanto process.

UNIT-III: Inorganic Spectroscopy –I

14 Hours

IR spectroscopy: Effect of coordination on the stretching frequency-sulphato, carbonato, sulphito, aqua, nitro, thiocyanato, cyano, thiourea, DMSO complexes; IR spectroscopy of carbonyl compounds. NMR spectroscopy- Introduction, applications of ^1H , ^{15}N , ^{19}F , ^{31}P -NMR spectroscopy in structural identification of inorganic complexes, fluxional molecules, quadrupolar nuclei- effect in NMR spectroscopy.

UNIT-IV: Inorganic Spectroscopy-II

13 Hours

Introductory terminologies: g and A parameters-definition, explanation and factors affecting g and A; Applications of ESR to coordination compounds with one and more than one unpaired electrons – hyperfine and secondary hyperfine splitting and Kramer’s doublets; ESR spectra of V(II), Mn(II), Fe(II), Co(II), Ni(II), Cu(II) complexes, bis(salicylaldehyde)copper(II) and [(NH₃)₅Co-O₂-Co(NH₃)₅]⁵⁺. Mossbauer spectroscopy – Mossbauer Effect, Recoil energy, Mossbauer active nuclei, Doppler shift, Isomer shift, quadrupole splitting and magnetic interactions. Applications of Mössbauer spectra to Fe and Sn compounds.

UNIT-V: Photo Electron Spectroscopy

14 Hours

Theory, Types, origin of fine structures - shapes of vibrational fine structures – adiabatic and vertical transitions, PES of homonuclear diatomic molecules (N₂, O₂) and heteronuclear diatomic molecules (CO, HCl) and polyatomic molecules (H₂O, CO₂, CH₄, NH₃) – evaluation of vibrational constants of the above molecules. Koopman’s theorem- applications and limitations.

Text Books

- J E Huheey, EA Keiter, RL Keiter and OK Medhi, (2016) *Inorganic Chemistry – Principles of structure and reactivity*, 4th Edition, Pearson Education Inc.,
- G L Meissler and D ATarr, (2018) *Inorganic Chemistry*, 3rd Edition, Pearson Education Inc.,

Reference Books

- Crabtree, Robert H. (2010) *The Organometallic Chemistry of the Transition Metals*. 3rd ed. New York, NY: John Wiley.
- P Gülich, E Bill, A X Trautwein, (2011) *Mossbauer Spectroscopy and Transition Metal Chemistry: Fundamentals and Applications*, 1st edition, Springer-Verlag Berlin Heidelberg,
- ,B. Douglas, D. McDaniel, J. Alexander, John Wiley, (1994), *Concepts and Models of Inorganic Chemistry*. 3rd edn.
- K. F. Purcell, J. C. Kotz, (2000) *Inorganic Chemistry*; Saunders: Philadelphia.
- R. S. Drago, (1977) *Physical Methods in Chemistry*; Saunders: Philadelphia.

Website and e-learning source:

<https://archive.nptel.ac.in/courses/104/101/104101100/>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom’s Level
CO-1	Understand and apply 18 and 16 electron rule for organometallic compounds	K1, K2
CO-2	Compare and contrast the structure and bonding in olefin, allyl, cyclopentadienyl and carbonyl containing organometallic compounds	K3
CO-3	Categorize the reactions of organometallic compounds and apply them in photo electron spectroscopy.	K4
CO-4	Prioritize the hydroformylation of olefins using cobalt or rhodium catalysts.	K5

CO-5	Identify the structure of coordination complexes using spectroscopic tools such as IR, NMR, ESR, Mossbauer and optical rotatory dispersion studies.	K6
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COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	3	2	1	1
CO2	3	3	3	2	2	1
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation : 73.3%; Medium Correlation: 16.7%; Low Correlation : 10%.

PHYSICAL CHEMISTRY-II PCHM416

Semester : IV
Category : Core XI
Class & Major : II M.Sc., Chemistry

Credit : 04
Hours/Week : 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Understand the essential characteristics of wave functions and need for the quantum mechanics.
CO-2	Know the importance of quantum mechanical models of particle in a box, rigid rotor and harmonic oscillator.
CO-3	Apply the quantum mechanics to hydrogen and polyelectronic systems.
CO-4	Familiarize the symmetry in molecules and predict the point groups.
CO-5	Predict the vibrational modes, hybridization using the concepts of group theory.

UNIT-I: Quantum Mechanics

12 Hours

Wave particle duality, Uncertainty principle, Particle wave and Schrodinger wave equation, wave function, properties of wave function. Properties of wave function, Normalized, Orthogonal, orthonormal, Eigen values, Eigen functions, Hermitian properties of operators. Introduction to quantum mechanics-black body radiation, photoelectric effect, hydrogen spectrum. Need for quantum mechanics, Postulates of Quantum Mechanics, Schrodinger wave equation, Time independent and time dependent

UNIT-II: Quantum Models:

12 Hours

Particle in a box-1D, two dimensional and three-dimensional, degeneracy, application to linear conjugated molecular system, free particles, ring systems. Harmonic Oscillator-wave equation and

solution, anharmonicity, force constant and its significance. Rigid Rotor-wave equation and solution, calculation of rotational constants and bond length of diatomic molecules.

UNIT-III: Applications To Hydrogen And Poly Electron Atoms: 13 Hours

Hydrogen atom and hydrogen like ions, Hamiltonian-wave equation and solutions, radial and angular functions, representation of radial distribution functions. Approximation methods –variation methods: trial wave function, variation integral and application to particle in 1D box. Perturbation method - first order applications. Hatrefock self-consistent field method, Helium atom-electron spin, paulis exclusion principle and Slater determination.

UNIT-IV: Group Theory 14 Hours

Groups, sub groups, symmetry elements, operations, classification-axial and non-axial. Dihedral point groups- C_n , C_{nh} , D_n , D_{nh} , D_{nd} , T_d and O_h . Matrix representation and classes of symmetry operations, reducible irreducible and direct product representation. The Great orthogonality theorem – irreducible representation and reduction formula, construction of character table for C_{2v} , C_{2h} , C_{3v} and D_{2h} point groups.

UNIT-V: Applications of Quantum and Group Theory 14 Hours

Hydrogen Molecule-Molecular orbital theory and Heitler London (VB) treatment, Energy level diagram, Hydrogen molecule ion; Use of linear variation function and LCAO methods. Electronic conjugated system: Huckel method to Ethylene butadiene, cyclopropenyl, cyclo butadiene and Benzene. Applications of group theory to molecular vibrations, electronic spectra of ethylene.

Text Book

- R.K. Prasad, (2010) *Quantum Chemistry*, New Age International Publishers, New Delhi, , 4th revised edition.
- F. A. Cotton, (2003) *Chemical Applications of Group Theory*, John Wiley & Sons, 2nd edition.

Reference Books

- N. Levine, (1983) *Quantum Chemistry*, Allyn& Bacon Inc, 4th edition.
- D.A. McQuarrie and J. D. Simon, (2012) *Physical Chemistry, A Molecular Approach*, Viva Books Pvt. Ltd, New Delhi,.
- R. P. Rastogi & V. K. Srivastava, (2019) *An Introduction to Quantum Mechanics of Chemical Systems*, Oxford & IBH Publishing Co., New Delhi.
- R.L. Flurry. Jr, (2011) *Symmetry Group Theory and Chemical applications*, Prentice Hall. Inc,
- J. M. Hollas, (2013) *Symmetry in Molecules*, Chapman and Hall, London, , Reprint.

Web Resources:

- <https://nptel.ac.in/courses/104101124>

- <https://ipc.iisc.ac.in/~kls/teaching.html>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recognize and discuss the characteristics of wave functions and symmetry functions.	K1, K2
CO-2	Classify the symmetry operation and wave equations.	K3
CO-3	Apply the concept of quantum mechanics and group theory to predict the electronic structure.	K4
CO-4	Analyze the specify appropriate irreducible representations for theoretical applications.	K5
CO-5	Develop skills in evaluating the energies of molecular spectra.	K6

COURSE MAPPING:

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	1	1	1
CO2	3	3	3	1	2	1
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation : 70%; Medium Correlation: 13.3%; Low Correlation : 16.7%.

**ANALYTICAL INSTRUMENTATION TECHNIQUES PRACTICAL
PCHR417**

Semester : IV
Category : Core-XII
Class & Major : II M.Sc., Chemistry

Credit : 04
Hours/Week : 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Design chromatographic methods for identification of species.
CO-2	Analyze different constituents through instrumental methods of analysis.
CO-3	Evaluate different contaminants in materials using turbidimetry and conductivity measurements.
CO-4	Categorize the experiments for analysis of inorganic and organic materials.
CO-5	Analyze constituents in materials using emission and absorption techniques.

UNIT-I: Any Five Experiments from the following

1. Determination of the equivalent conductance of a weak acid at different concentrations and verifying Ostwald dilution law. Calculation of the dissociation constant of the acid.

- Determination of the equivalent conductance of a strong electrolyte at different concentrations and examining the validity of the Onsager's theory as limiting law at high dilutions.
- Determination of pK_a of weak acid by EMF method.
- Potentiometric titration of FAS Vs $K_2Cr_2O_7$
- Potentiometric titration of KI Vs $KMnO_4$.
- Potentiometric titration of a mixture of Chloride and Iodide Vs $AgNO_3$.
- Determination of the pH of buffer solution by EMF method using Quinhydrone and Calomel electrode.

UNIT-II:

- Separation of (a) mixture of Azo dyes by TLC (b) mixture of metal ions by Paper chromatography.
- Calculate R_f Value of different colored substances through Thin layer Chromatography.
- Separate the Plant extract by Column Chromatography and Calculate R_f Value.

UNIT-III: Interpretation and identification of the given spectra of various organic compounds arrived at from the following instruments

- UV-Visible
- IR

Text Books

- Vogel's (2003) *Text book of Practical Organic Chemistry*, 5th Ed, ELBS/Longman, England.
- G. H. Jeffery, J. Bassett, J. Mendham and R. C. Denney, Vogel's (1989) *Textbook of Quantitative Chemical Analysis*; 6th ed., ELBS,

Reference books

- N. S. Gnanapragasam and G. Ramamurthy, (2009) *Organic Chemistry – Labmanual*, S. Viswanathan Co. Pvt. Ltd.,
- J. N. Gurtu and R. Kapoor, (2011) *Advanced Experimental Chemistry*, S. Chand and Co.
- J. B. Yadav, (2001) *Advanced Practical Physical Chemistry*, Goel Publishing House.
- G.W. Garland, J.W. Nibler, D.P. Shoemaker (2009), *Experiments in Physical Chemistry*, 8th edition, McGraw Hill,.
- J. N. Gurthu and R. Kapoor, (1987) *Advanced Experimental Chemistry*, S. Chand and Co.

WEB RESOURCES:

- <https://bit.ly/3QESF7t>
- <https://bit.ly/3QANOnX>

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recite the principles associated with various inorganic organic and physical chemistry experiments	K1, K2
CO-2	Apply the knowledge to scientifically plan and perform all the experiments	K3
CO-3	Analysis and record systematically the readings in all the experiments	K4
CO-4	Calculate and process the experimentally measured values and compare with graphical data.	K5
CO-5	Interpret the experimental data scientifically to improve student's efficiency for societal developments.	K6

COURSE MAPPING:

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	2	2	2	2	1
CO2	3	3	3	3	2	1
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation : 66.7%; Medium Correlation: 26.7%; Low Correlation : 6.6%.

**POLYMER CHEMISTRY
PCHM418**

Semester : IV
Category : Elective VI
Class & Major : II M.Sc., Chemistry

Credit : 03
Hours/Week : 05
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Provide a thorough understanding of the basic concept of polymers
CO-2	Gain knowledge about the different polymerization mechanisms
CO-3	Learn the molecular weight determination and characterization of polymers.
CO-4	Exploit the polymer processing techniques for various applications.
CO-5	Study the importance of advanced polymers

UNIT I Introduction to polymer science**13 Hours**

Classification - Some basic definitions - Addition and condensation polymerizations and copolymerization -. Molecular forces in polymers - functionality- degree of polymerization- polymers tacticity -Polymerization techniques - Emulsion, bulk, suspension and solution

polymerization. High-temperature inorganic polymers - Preparation, properties, structure and applications of silicone polymers.

UNIT II: Kinetics and mechanism of polymerization **13 Hours**

Polymerization - Definition - Types - Chain and step polymerization. Mechanism of ionic, radical, coordination polymerization (Ziegler-Natta catalyst), polycondensation and polyaddition polymerization. Kinetics of ionic and radical polymerization. Kinetic chain length and degree of polymerization. Copolymers - Block and graft copolymers - Kinetics of copolymerization.

UNIT III: Molecular weight and Characterization of polymers **13 Hours**

Molecular weight of polymers - Number average and weight average molecular weight of polymers. Determination of molecular weight of polymers by GPC and Viscometry methods - Thermal analysis of polymers using DSC - Crystalline melting point (T_m) - Glass transition temperature (T_g) - Measurement of T_g - Relation between T_m and T_g - Crystallinity in polymers.

UNIT IV: Polymer processing techniques **13 Hours**

Polymer additives - Fillers, plasticizers, stabilizers, colorants and anti-oxidants, lubricants - functions and examples. Compounding - Processing techniques - Calendaring, die casting, rotational casting, film casting, injection moulding, compression moulding, blow moulding, extrusion moulding, foaming, thermos-foaming, reinforcing and fiber spinning.

UNIT V: Advanced polymers **13 Hours**

Polyelectrolytes - Conducting polymers - Biodegradable polymers - Heat resistant polymers. - Polymer blends - Polymer nanocomposites. Biomedical polymers - Artificial organs - Artificial heart, kidney, skin and cells- Contact lens - Dental polymers - Polymers for controlled drug delivery. Polymers in separation - Polymeric membranes for Reverse Osmosis, Gas separation and liquid separation.

Text Books

- Billmeyer, F. W. (2017). *Text Book of Polymer Science* (3rd Ed., Unit I to IV.). New Delhi: Gurukripa Enterprises
- Allock, H. R., Lampe F. W., & Mark J. E. (2016). *Contemporary Polymer Chemistry* (3rd Ed, Unit V.). Pearson Education.

COURSE OUTCOMES:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recall the basic concept of polymers and the chemistry of organic and inorganic polymers	K1, K2

CO-2	Classify the kinetics and mechanism of various polymerization techniques.	K3
CO-3	Choose an appropriate analytical method to characterize polymers.	K4
CO-4	Categorize an appropriate moulding technique to process a particular polymer.	K5
CO-5	Illustrate the importance of advanced polymers like biodegradable polymers.	K6

COURSE MAPPING

CO/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO1	3	3	2	1	1	1
CO2	3	3	2	2	1	1
CO3	3	3	3	3	2	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation : 70%; Medium Correlation: 13.3%; Low Correlation : 16.7%.

III and IV Evaluation Component

Semester	Course code	Course title	Component III	Component IV
III	PCHM304	Organic synthesis and Photochemistry	Seminar	Reaction Mechanism
III	PCHM305	Coordination Chemistry-I	Seminar	Assignment
III	PCHM308	Industrial Chemistry	Chart Preparation	Sample collection
III	PCHO306	Pharmacognosy and Phytochemistry	Sample analyze	Assignment
III	PCHO307	Chemistry In Food Preservation	Collect the preservatives	Aptitude test
III	PCHI302	Characterization of Materials	Seminar	Assignment
IV	PCHM415	Coordination Chemistry-II	Seminar	Chart Preparation
IV	PCHM416	Physical Chemistry-II	Model Preparation	Problem solving
IV	PCHO418	Polymer Chemistry	Seminar	Assignment

PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY

PREAMBLE:

UG: Programme profile & the syllabi of courses offered in semester III and IV along with III and IV evaluation components (with effect from 2023 – 2026 batch onwards).

PG: Programme profile & the syllabi of courses offered in semester III and IV along with III and IV evaluation components (with effect from 2023 – 2025 batch onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	On completion of this programme, students will be able to
PSO-1	Understand fundamental principles and concepts of biochemistry, including the structure and function of biomolecules present in living cells.
PSO-2	Acquire proficiency in laboratory techniques commonly used in biochemistry, including cell biology, chromatography, spectroscopy, biochemical analysis etc.,
PSO-3	Inculcate the basic concepts of Biochemistry, fundamental biochemical Principles and their applications in a systematic, methodological and scientific, evidence-based process.
PSO-4	Relate the applications of biochemistry in biotechnology and pharmaceutical industries, including the development of new drugs and biotechnological processes in securing a successful career and pursue higher studies.
PSO-5	Communicate scientific ideas and findings effectively through written reports, oral presentations, and other forms of scientific communication.
PSO-6	Develop problem solving and analytical skills through case studies, research projects, experimentation, internship, experiential learning and hands-on-experience.

PROGRAMME PROFILE OF B.Sc., BIOCHEMISTRY

Semester	Part	Category	Course code	Course Title	Hours per week	Credit
I	I	Language	UTAL110/ UHIL102/ UFRL102	General Tamil I / Hindi I / French I	5	3
	II	English	UENL111	General English I	5	3
	III	Core I / DSC - I	UBCM109	Nutritional Biochemistry	4	3
		Core Practical I / DSC Practical - I	UBCR104	Nutritional Biochemistry Practical	3	3
		Allied I / GE I	UCHA105	Chemistry for Biological Science I	4	3
		Allied Practical I / GE - I	UCHR106	Volumetric Analysis I	3	2
	IV	SEC-Foundation Course	UBCF101	Fundamentals of Biochemistry	2	2
		SEC - I / NME I			2	2
		AECC / Soft Skill - 1	USKS103	Communicative English	2	2
TOTAL					30	23
II	I	Language	UTAL210/ UHIL201/ UFRL201	General Tamil II / Hindi II / French II	5	3
	II	English	UENL211	General English II	5	3
	III	Core II / DSC - II	UBCM204	Cell Biology	4	3
		Core practical II / DSC Practical II	UBCR203	Cell Biology Practical	3	3
		Allied II / GE - II	UCHA204	Chemistry for Biological Science II	4	3
		Allied Practical II	UCHR205	Organic Analysis II	3	2
	IV	SEC II / NME II			2	2
	III	Internship	UINS201	Internship / Industrial training	-	-/2
	IV	DC I / SEC I	UBCD201	First Aid	2	2
	IV	AECC / Soft Skill - II			2	2
	V	Extension (Outside class Hours)			--	1/2
	VI	Value Added Course (Outside class Hours)			--	-/2
	TOTAL					30	24/29
III	I	Language	UTAL310/ UHIL301/ UFRL301	General Tamil III / Hindi III / French III	5	3
	II	English	UENL311	General English III	5	3
	III	Core III / DSC - III	UBCM306	Biomolecules	3	3
		Core Practical III / DSC Practical - III	UBCR303	Biomolecules Practical	3	3
		Allied III / GE -III	UMBA301	Allied Microbiology	3	3
		Allied Practical III / GE III	UMBR302	Allied Microbiology Practical	3	2
	IV	SEC III / Entrepreneurial	UBCU301	Medical Laboratory Technology	2	1

		SEC IV	UBCD302	Biomedical Instrumentation	2	2
		AECC / Soft Skill III			2	2
		Value Education			2	2
TOTAL					30	24
IV	I	Language	UTAL410/ UHIL401/ UFRL401	General Tamil IV / Hindi IV / French IV	5	3
	II	English	UENL411	General English IV	5	3
	III	Core IV / DSC – IV	UBCM405	Biochemical Techniques	4	3
		Core practical IV	UBCR403	Biochemical Techniques Practical	3	3
		Allied IV/ GE –IV	UMAA406	Biostatistics	4	3
		Allied Practical IV	UMAR401	Biostatistics Practical	3	2
	IV	NME III/SEC III		Online Course	2	2
		AECC / Soft Skill IV			2	2
		SEC/DSC	UBCD401	Basics of Forensic Science	2	2
		Internship	UINS401	Internship / Industrial training	-	-/2
	V	Extension (Outside class Hours)			--	-/2
VI	Value Added Course (Outside class Hours)			--	-/2	
TOTAL					30	23/29
V	III	Core V /DSC – V	UBCM509	Enzymes	5	4
		Core VI /DSC – VI	UBCM510	Intermediary Metabolism	5	4
		Core VII / DSC – VII	UBCM511	Clinical Biochemistry	4	4
		Core practical V	UBCR502	Clinical Biochemistry Practical	6	3
		Core Elective – I / DSE – I	UBCO503	Immunology	4	3
			UBCO504	Research Methodology		
	Project	UBCP601	Project	4	4	
IV	Environmental Studies			2	2	
TOTAL					30	24
VI	III	Core VIII / DSC – VIII	UBCM608	Molecular Biology	6	4
		Core IX/ DSC – IX	UBCM609	Human Physiology	6	4
		Core Practical VI	UBCR603	Hematology & Urine Analysis	3	4
		Core Elective – II / DSE – II	UBCO608	Biotechnology	5	3
			UBCO609	Bio informatics		
		Core Elective – III / DSE – III	UBCO610	Plant Biochemistry & Plant Therapeutics	6	4
			UBCO611	Pharmaceutical Biochemistry		
		Core X/ DSC X	UBCM604	Comprehensive Viva Voce	-	1
	Internship	UINS601	Internship	-	-/2	
	IV	Soft Skill/ SEC	UBCC601	Professional Competency Skill	4	2
V	Extension activity/		Extension activity/ Physical Education/NCC	-	-/2	
VI	Value Added Course			-	-	
TOTAL					30	22/26
GRAND TOTAL					180	140/155

**COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVES (NME)**

Semester	Part	Category	Course code	Course Title	Contact Hour/Week	Credit
I	IV	Non Major Elective	UBCE101	Nutrition & Health	2	2
			UBCE102	Medicinal Diet		
II	IV	Non Major Elective	UBCE211	Lifestyle Diseases	2	2

ALLIED COURSES

Semester	Part	Category	Course code	Course Title	Contact Hour/Week	Credit
I	III	Allied	UBCA102	Allied Biochemistry	4	3
			UBCR102	Allied Biochemistry Practical	3	2
II	III	Allied	UBCA201	Allied Biochemistry	4	3
			UBCR201	Allied Biochemistry Practical	3	2

EXTRA CREDIT EARNING PROVISION (ONLY FOR INTERESTED STUDENTS)

Semester	Part	Course Code	Course Title	Duration	Min/Max Credit
II	III	UBCI201	Internship	30 / 60 Hours	1/2
IV	III	UBCI401	Internship	30 / 60 Hours	1/2
VI	III	UBCI601	Internship	30 / 60 Hours	1/2
V	III	UBCS501	Self Study Paper Experimentation	--	2
III	III	--	Online Course	Min 8 Weeks	2

BIOMOLECULES
(UBCM306)

Semester : III
Category : Core III/DSC III
Class & Major : II B.Sc., Biochemistry

Credits : 3
Hours / week : 3
Total Hours : 39

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Introduce the structure, properties and biological significance of carbohydrates
CO -2	Comprehend the classification, functions and acid base properties of amino acids
CO-3	Elucidate the various levels of organization of Proteins.
CO- 4	Impart knowledge on the classification, properties and characterization of lipids.
CO- 5	Acquire knowledge on structure, properties and functions of DNA & RNA

UNIT I: CARBOHYDRATES

8 Hours

Carbohydrates- Classification and biological significance, physical properties - stereo isomerism, optical isomerism, anomers, epimers and mutarotation. Monosaccharides: Occurrence, linear and cyclic structure, Reactions of monosaccharides due to the presence of hydroxyl, aldehyde and keto groups. Disaccharides: Structure and properties of reducing disaccharides (lactose and mannose), non-reducing disaccharide (sucrose). Polysaccharides: Homopolysaccharides - Occurrence, structure and biological significance of starch, glycogen and cellulose. Heteropolysaccharides - Structure and biological significance of mucopolysaccharides - hyaluronic acid, chondroitin sulphate and heparin. (Structural elucidation not needed).

UNIT II: AMINO ACIDS

8 Hours

Amino acids- Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. Modified amino acids in protein, non - protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids such as Ninhydrin, Xanthoproteic, Millions, Nitroprusside and Lead Acetate.

UNIT III: PROTEINS

8 Hours

Proteins- Classification based on shape, composition, solubility and functions. Properties of proteins - Ampholytes, isoelectric point, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure,

Formation and characteristics of peptide bond, secondary structure- α helix (egg albumin), β - pleated sheath (keratin). Tertiary structure – with reference to myoglobin. Quaternary structure with reference to hemoglobin.

UNIT IV: LIPIDS

8 Hours

Lipids - Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides: structure and general properties, Characterization of fats- iodine value, saponification value, acid number, acetyl number, Polenske number, Reichert-Meissl number along with their significance. Compound lipids- Structure and functions of phospholipids and glycolipids. Derived lipids - Structure and functions of cholesterol, bile acids and bile salts.

UNIT V: NUCLEIC ACIDS

7 Hours

Nucleic acids- Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z DNA, structure and biological significance, super helicity. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA , Secondary and tertiary structure of tRNA. Properties of DNA-Hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing.

Text books

- U.Sathyanarayana & U.Chakrapani (2013). *Biochemistry (5th edition)*, Elsevier India Pvt. Ltd., Books & Allied Pvt. Ltd.
- J.L.Jain, Sunjay Jain, Nitin Jain (2013). *Fundamentals of Biochemistry (7th edition)*, S.Chand & Company Ltd.

Reference books

- DavidL.Nelson, MichaelM.Cox (2005), *Principles of Biochemistry (4th edition)*. W.H.Freeman and Company.
- Voet.D, Voet.J.G. and Pratt, C.W (2004) *Principles of Biochemistry(4th edition)*. JohnWiley & Sons,Inc.
- Zubay G.L, *et.al.*, (2020), *Principles of Biochemistry (5st edition)*. WmC Brown Publishers.

e-Books

- <http://aulanni.lecture.ub.ac.id/files/2012/01/15616949-Lehninger-Principles-of-Biochemistry-1-copy.pdf>
- <https://pdfcoffee.com/book-4-biochemistry-4ed-voet-pdf-pdf-free.html>
- https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/medicalbiochemistry.pdf

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Identify and describe the structure and function of key biomolecules, including proteins, nucleic acids, lipids, and carbohydrates.	K1, K2
CO-2	Explain the classification and properties of biomolecules.	K3
CO-3	Describe the levels of biomolecules structure and their relationship to function.	K4
CO-4	Integrate knowledge from different areas of biochemistry to understand the holistic functioning of living organisms.	K5
CO-5	Demonstrate advanced topics in Biomolecular sciences, including the classification, structures, functions, and biological roles of biomolecules.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	0	1	1	1	1
CO2	3	0	1	1	3	1
CO3	3	0	1	1	3	1
CO4	3	0	1	2	1	1
CO5	3	0	1	2	3	1

High Correlation : 27% Medium Correlation : 6 % Low correlation : 50% No correlation : 17%

ALLIED MICROBIOLOGY
(UMBA301)

Semester : III
Category : Allied III/GE III
Class & Major : II B.Sc., Biochemistry

Credits : 3
Hours / week : 3
Total Hours : 39

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Understand the different types of microbes and types of culture media employed to isolate the microorganisms.
CO -2	Aware about the microbes present in the environment.
CO -3	Identify the common infectious agents and the diseases that they cause.
CO -4	Acquaint students with basic concepts of microbial diversity and how the microbe concept emerged in the industries.
CO-5	Appreciate various methods of sterilization employed to ensure aseptic conditions in microbiology.

UNIT - I INTRODUCTION

8 Hours

History and Scope of Microbiology- Prokaryotes and Eukaryotes- Bacteria, Fungi, Algae, Protozoa and Viruses- Structure and functions of the cellular components - Growth and nutrition-media and culture.

UNIT - II CLASSIFICATION OF MICROBES

8 Hours

Classification of microbes- Numerical taxonomy- Molecular taxonomy- methods of microbial identification. Gram positive and gram negative bacteria.

UNIT - III ENVIRONMENTAL MICROBIOLOGY

8 Hours

Microbiology of soil – normal microflora - role of soil microbes in biogeochemical cycles (C,N,S). Microorganisms in Agricultural Waste water treatment, Vermiculture, Microbial pesticides. Biogeochemical importance of bacteria in Marine & freshwater ecosystems

UNIT - IV MEDICAL MICROBIOLOGY

8 Hours

Sterilization and disinfection. Disease reservoirs- Epidemiological terminologies, Infectious disease transmissions. Respiratory infection caused by bacteria and viruses; Tuberculosis, AIDS, water borne diseases. Antimicrobial agents, antibiotics - Penicillins and cephalosporins, broad spectrum antibiotics.

UNIT - V INDUSTRIAL MICROBIOLOGY

7 Hours

Industrial use of microbes - fermentors and fermentation technology, Industrial production of alcohol, antibiotics, aminoacids and enzymes. Microbiology of food- sources of contamination- food spoilage- food preservation methods.

Text Books

- Pelczar, M.J. Chan, E.C.S. King, N.R. (2001). *Microbiology - Concepts and Applications*. Tata McGraw Hill. New Delhi.
- Ananthanarayan, R. and Paniker, C.K.J. (2000). *A text book of Microbiology (6th ed)*. Orient Longman Ltd. Hyderabad.

Reference Books

- Kathleen Park Talaro and Talaro, A. (2021) *Foundation in Microbiology (11th Edition)* McGraw Hill. New York.
- Cappuccino, J.G and Sharman, N. (2013) *Microbiology: A Laboratory manual (10th Edition)* Addition Wesley Longman Inc. New York.

e-Books

- https://rlmc.edu.pk/themes/images/gallery/library/books/Microbiology/Text_Book_of_Microbiology.pdf
- https://samples.jbpub.com/9781449688615/47964_ch01_0001.pdf

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Define and summarize the classification of microbes and their role in medicine, industries and environment.	K1, K2
CO-2	Apply the microbial principles in various fields such as medicine, environment and industries.	K3
CO-3	Analyze the complex relationship between different microbial taxonomy and their impact on environment, medical and industrial fields.	K4
CO-4	Evaluate on the various microbes involved in causing infectious diseases and their role in industries.	K5
CO-5	Develop novel diagnostic tools for emerging diseases and biotechnological solutions for industrial challenges.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	3	1	1	0
CO2	3	3	2	3	1	1
CO3	3	2	2	2	1	1
CO4	3	3	3	2	1	3
CO5	3	3	2	2	3	3

High correlation: 47 % Medium correlation: 23 % Low correlation : 27 % No correlation : 3%

**BIOMOLECULES PRACTICAL
(UBCR303)**

Semester	: III	Credits	: 3
Category	: Core Practical III/ DSC Practical III	Hours / week	: 3
Class & Major	: II B.Sc Biochemistry	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Identify the biomolecules carbohydrates and aminoacids by qualitative test.
CO -2	Determine the quality of Lipids by titrimetric methods.
CO -3	Isolate nucleic acids from plant and animal source.

QUALITATIVE TEST (ANY FIVE) 15 Hours

1. Carbohydrates

a) Glucose b) Fructose c) Arabinose d) Maltose e) Sucrose f) Lactose g) Starch

2. Amino acids

a) Arginine b) Cysteine c) Histidine d) Proline e) Tryptophan f) Tyrosine g) Methionine

TITRIMETRIC METHODS (ANY TWO) 15 Hours

3. Determination of Saponification value of an edible oil

4. Determination of Iodine number of an edible oil

5. Determination of Acid number of an edible oil

GROUP EXPERIMENTS 9 Hours

6. Isolation of DNA from plant/animal source.

7. Isolation of RNA from rich source.

8. Isolation of Glycogen from Liver / Spleen

Text books

- David T Plummer, *An Introduction to Practical Biochemistry (3rd edition)*, Tata Mc Graw-Hill Edition.
- J. Jayaraman, (2015), *Laboratory Manual in Biochemistry (5th edition)*, New Age International (P) Limited.

Reference books

- S. Sadasivam A. Manickam, (2018), *Biochemical Methods (3rd edition)*, New age International (P) Limited.
- S.K. Sawhney, Randhir Singh, (2013), *Introductory Practical Biochemistry (7th edition)*. CBS Publications.

- Anil Kumar, SarikaGarg and NehaGarg. VinodVasishtha (2012), *Biochemical Tests - Principles and Protocols*. Viva Books Pvt Ltd,.
- Keith Wilson and John Walker, (2010) *Principles and Techniques of Practical Biochemistry (7th edition)*, Cambridge University Press, Britain.

e- Books

- <https://ttk.elte.hu/dstore/document/871/book.pdf>
- <https://skyfox.co/wp-content/uploads/2020/12/Practical-Manual-of-Biochemistry.pdf>

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Independently undertake qualitative and quantitative analysis of biomolecules	K1, K2
CO-2	Determine the saponification, iodine and acid number present in edible oil by titrimetric method.	K3
CO-3	Qualitatively analyse the carbohydrates and amino acids present in the unknown solution.	K4
CO-4	Isolate RNA and DNA from plant and animal sources.	K5
CO-5	Evaluate the amount of biomolecules in given sample.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	3	3	2	3	1	2
CO3	3	3	2	2	1	2
CO4	3	3	2	2	1	2
CO5	3	3	3	3	3	3

High correlation: 53% Medium correlation: 33% Low correlation: 14%

**ALLIED MICROBIOLOGY PRACTICAL
(UMBR302)**

Semester	: III	Credits	: 2
Category	: Allied Practical III/ GE Practical III	Hours / week	: 3
Class & Major	: II B.Sc Biochemistry	Total Hours	: 39

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Learn basic principle & practice in a microbiology laboratory.
CO -2	Obtain culture, identify and explain microorganisms in environmental cultures.
CO-3	Learn the biosafety measures in a microbiology laboratory.

EXPERIMENTS

1. Use of Microscope, Principle of Fixation and Staining.
2. Preparation of Microbiological Media.
3. Dispose of Microbes - Control of Microbial Contamination by Sterilization Techniques.
4. Identification of Microbes Through Staining By Simple & Differential Methods
5. Microbial Pure Culture by Isolation Techniques.
6. Identification and Enumeration of Microorganisms from Soil.
7. Determination of Growth Pattern by Growth Curve Methods.
8. Biosafety in Microbiological and Biomedical Laboratories

Reference books

- Kathleen Park Talaro & Talaro, A. (2010). *Foundation in Microbiology (2nd edition)*. Mc Graw Hill. New York.
- Cappuccino, J.G. & Sharman, N. (2005) *Microbiology: A Laboratory Manual*. Addition Wesley Longman Inc. New York.

e-Books

- <https://www.routledge.com/Practical-Handbook-of-Microbiology/Green-Goldman/p/book/9780367567637>
- <https://vlab.amrita.edu/?sub=3&brch=76>

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Define and summarize the classification of microbes and their role in medicine, industries and environment.	K1, K2
CO-2	Apply the microbial principles in various fields such as medicine, environment and industries.	K3
CO-3	Analyze the complex relationship between different microbial taxa and their impact on environment, medical and industrial fields.	K4
CO-4	Evaluate on the various microbes involved in causing infectious diseases and their role in industries.	K5
CO-5	Develop novel diagnostic tools for emerging diseases and biotechnological solutions for industrial challenges.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	3	3	2	3	1	2
CO3	3	3	2	2	1	2
CO4	3	3	2	2	1	2
CO5	3	3	3	3	3	3

High correlation: 53% Medium correlation: 33% Low correlation: 14%

**MEDICAL LABORATORY TECHNOLOGY
(UBCU301)**

Semester	: III	Credits	: 1
Category	: SEC III/Entrepreneurial	Hours / week	: 2
Class & Major	: II B.Sc Biochemistry	Total Hours	: 26

COURSE OBJECTIVES:

CO No	To enable the students to
CO-1	Impart knowledge on specimen collection and disposal of waste.
CO -2	Acquaint on collection, preservation and transfusion of blood.
CO-3	Quantify the biomolecules in biological sample.
CO -4	Understand the significance of various tests and their interpretation in diseased conditions
CO- 5	Familiarize on enzymes, hormones and Immunoglobulins as markers for diagnosis.

UNIT I: COLLECTION, TRANSPORT, ANALYSIS OF SPECIMEN 6 Hours

Collection, transport, analysis of specimen- blood, routine urine, feces, sputum, semen, CSF Documentation of samples & results. Disposal of laboratory/ hospital waste- Non infectious waste, biomedical waste, infected sharp waste disposal, infected non sharp disposal- color coding as per guidelines.

UNIT II: DETERMINATION OF BLOOD GROUP AND RH FACTOR 5 Hours

Determination of Blood group and Rh factor -Basic blood banking procedures- cross matching, screening test. Blood transfusion and hazards.

UNIT III: ESTIMATION OF BLOOD SUGAR 5 Hours

Estimation of blood sugar – Enzymatic method, HbA1C, Qualitative and quantitative analysis of urine sample- NPN-urea, uric acid, creatinine. Mineral, vitamin and CSF analysis.

UNIT IV: IMMUNO DIAGNOSTICS 5 Hours

Immuno diagnostics -Widal test, VDRL test, ASO, RA, CRP and Complement fixation Test. RIA, ELISA,, Skin test – Montaux and Lepramin test.

UNIT V: ASSAY OF CLINICALLY IMPORTANT ENZYMES 5 Hours

Assay of clinically important enzymes- Estimation of clinically important hormones – Insulin, Thyroid and Reproductive hormones and its clinical significance.

Text Books

- Kanai L Mukherjee and Anuradha Chakravarthy(2022), *Medical Laboratory Technology, Vol I (4th edition.)*
- Ramnik Sood, (2006), *Text Book of Medical Laboratory Technology*, Jaypee Publishers.

- Tietz, N. (2018), *Fundamentals of Clinical Chemistry and Molecular Diagnostics (8th Edition)*, W.B. Saunders Company

Reference books

- Richard A. McPherson; Matthew R. Pincus (2021) *Henry's Clinical Diagnosis and Management by Laboratory Methods (24th Edition)*.
- Frances Fischbach; Marshall B. Dunning (2014) *A Manual of Laboratory and Diagnostic Tests (9th Edition)*.

e- Books

- <https://ttk.elte.hu/dstore/document/871/book.pdf>
- <https://skyfox.co/wp-content/uploads/2020/12/Practical-Manual-of-Biochemistry.pdf>
- https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/med_lab_tech_students/medicallabtechnology.pdf

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Summarize the specimen collection techniques, blood group determination and other examinations.	K1, K2
CO-2	Apply the knowledge of immunotechniques for diagnosing various diseases.	K3
CO-3	Analyze the clinically important enzymes and their characteristic role in clinical diagnosis.	K4
CO-4	Estimate the blood sugar level and other vital components in the body.	K5
CO-5	Design novel immuno diagnostic techniques to diagnose various emerging diseases in the society.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	1	1	1
CO2	3	2	2	2	1	1
CO3	3	2	2	2	1	1
CO4	3	3	3	2	1	1
CO5	3	3	2	2	3	3

High correlation: 40 % Medium correlation: 30 % Low correlation: 30 %

**BIOMEDICAL INSTRUMENTATION
(UBCD302)**

Semester : III
Category : SEC-IV
Class & Major : II B.Sc Biochemistry

Credits : 2
Hours / week : 2
Total Hours : 26

COURSE OBJECTIVES:

CO No	The students will be able to
CO- 1	Provide insights about the blood pressure and its measurement.
CO -2	Elaborate the mechanism of instruments related to respiration.
CO-3	Highlight the importance of imaging techniques.
CO- 4	Acquaint students about the basics of medical assisting devices.
CO -5	Familiarize about the life saving therapeutic equipments.

UNIT I: BLOOD PRESSURE

6 Hours

Measurement of blood pressure - sphygmomanometer. Cardiac output - Cardiac rate-
 Heartsound - Stethoscope, ECG - EEG - EMG - ERG.

UNITII: MONITORING OF INSPIRED/EXPIRED GASES

5 Hours

Monitoring of inspired/expired anaesthetic gases, capnograph, inhalators, nebulizers,
 aspirators, infant respirator, Plethysmography.

UNIT III: MEDICAL IMAGING

5 Hours

Medical imaging: X-ray machine - Radio graphic and fluoroscopic techniques -
 Computed tomography - MRI - PET, Ultrasonography - Endoscopy - Thermography.

UNIT IV: ASSISTING EQUIPMENTS

5 Hours

Assisting equipments: Pacemakers - Defibrillators - Ventilators

UNIT V: THERAPEUTIC EQUIPMENTS

5 Hours

Therapeutic equipments: Nerve and muscle stimulators- Diathermy- Heart - Lung
 machine- Audio meters- Dialyzers.

Text books

- M.Arumugam, (2013) *Bio-Medical Instrumentation*, Anuradha Agencies.
- L.A. Geddes and L.E.Baker, (2008) *Principles of Applied Bio-Medical Instrumentation*, John Wiley & Sons.

Reference books

- Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, (2002), *Bio-Medical Instrumentation and Measurements*, (2nd Edition), Pearson Education.
- R.S.Khandpur, (2014) *Handbook of Bio-Medical instrumentation*, Tata McGraw Hill Publishing Co Ltd.,

e- Books

- <https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138IIVeHClJ4nskArYr1Dg>
- <https://kanchiuniv.ac.in/coursematerials/Biomedical%20instrumentation.pdf>
- <https://pdfcoffee.com/biomedical-instrumentation-and-measurements-pdf-free.html>

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Explain and interpret blood pressure, x-rays, MRI, CT and ultrasound images	K1, K2
CO-2	Apply the anesthesia principles in monitoring the inspired and expired gases.	K3
CO-3	Examine the X-ray imaging machine and other medical assisting equipments.	K4
CO-4	Determine the usage of dialyzers, stimulators, defibrillators, etc.	K5
CO-5	Construct new therapeutic equipments for the better treatment.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	1	1
CO2	2	3	2	2	1	1
CO3	0	3	2	3	1	1
CO4	0	3	2	3	1	1
CO5	0	3	2	3	2	3

High correlation: 30 % Medium correlation: 33 % Low correlation: 27% No Correlation: 10%

BIOCHEMICAL TECHNIQUES
(UBCM405)

Semester : IV
 Category : Core IV/DSC-IV
 Class & Major : II B.Sc Biochemistry

Credits : 3
 Hours / week : 4
 Total Hours : 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Introduce the basic principles, types and applications of various sedimentation technique
CO -2	Provide an understanding of the underlying principles of chromatographic techniques
CO-3	Demonstrate experimental skills in various electrophoretic techniques.
CO -4	Appraise the use of colorimetric and spectroscopic techniques in biology
CO- 5	Impart knowledge about the measurement of radioactivity and safety aspects of radioactive isotopes.

UNIT I: CENTRIFUGATION

12 Hours

Centrifugation- Basic principles, RCF, Sedimentation coefficient, Svedberg constant. Types of rotors. Preparative centrifugation- differential and density gradient centrifugation, Rate zonal and Isopycnic techniques, construction, working and applications of analytical ultracentrifuge-Determination of molecular weight (Derivation excluded)

UNIT II: CHROMATOGRAPHY

10 Hours

Chromatography - adsorption, partition. Principle, instrumentation and applications of paper chromatography, thin layer chromatography, ion-exchange chromatography, gel permeation chromatography and affinity chromatography.

UNIT III: ELECTROPHORESIS

10 Hours

Electrophoresis – General principles, factors affecting electrophoretic mobility. Tiselius moving boundary electrophoresis. Electrophoresis with paper and starch. Principle, instrumentation and applications of agarose gel electrophoresis and SDS-PAGE.

UNIT IV: ELECTROMAGNETIC RADIATIONS, COLORIMETRY, SPECTROPHOTOMETRY

10 Hours

Basics of Electromagnetic radiations- Energy, wavelength, wave number and frequency. Absorption and emission spectra, Lambert - Beer Law, Light absorption and transmittance. Colorimetry- Principle, instrumentation and applications. Visible and UV spectrophotometry - Principle, instrumentation and applications- enzyme assay, structural studies of proteins and nucleic acids.

UNIT V: RADIOACTIVITY

10 Hours

Radioactivity - Types of Radioactive decay, half-life, units of radioactivity, Detection and measurement of radioactivity - Methods based upon ionization -Geiger Muller Counter. Methods based upon excitation - Solid & Liquid scintillation counters. Autoradiography. Biological applications and safety aspects of radioisotopes.

Text books

- Avinash Upadhyay, Kakoli Upadhyay & Nirmalendu Nath (2002), *Biophysical Chemistry, Principles and Techniques*, (3rd edition), Himalaya Publishing House.
- L.Veerakumari (2009), *Bioinstrumentation*, (1st edition), MJP Publishers.

Reference books

- Terrance G. Cooper (1977), *The tools of Biochemistry*, John Wiley & Sons, Singapore.
- Gurumani (2011), *Research Methodology for Biological Sciences*, (1st edition), MJP Publishers.
- Saroj Dua, Neera Garg, (2010), *Biochemical Methods of Analysis*, (1st edition), Narosa Publishing house.

e-Books

- <https://www.dcrustlms.in/upload/AA095-14-Upadhyay%20-%20Biophysical%20Chemistry.pdf>
- <https://enggbiochem.files.wordpress.com/2014/08/biophysical-chemistry.pdf>

COURSE OUTCOMES:

CO No.	On completion of this course, students will be able to	Bloom's Level
CO-1	Define and explain the various biochemical techniques such as centrifugation, chromatography, electrophoresis and photometric techniques.	K1 & K2
CO-2	Apply the principles of colorimetry, chromatography and electrophoresis for the separation and purification of components.	K3
CO-3	Analyze the applications of biochemical techniques in various fields.	K4
CO-4	Estimate the amount of radioactivity using various measurement methods and methods to reduce the impact of radioactivity.	K5
CO-5	Develop new technologies to improve the process of separation and purification of compounds.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	3	2	1	1
CO2	2	3	3	2	2	2
CO3	2	3	2	3	2	2
CO4	0	0	2	1	1	2
CO5	0	0	1	2	3	3

High correlation: 27 % Medium correlation: 40 % Low correlation: 20 % No correlation: 13 %

BIOCHEMICAL TECHNIQUES PRACTICAL
(UBCR403)

Semester	:IV	Credits	: 3
Category	: Core practical IV	Hours / week	: 3
Class & Major	: II B.Sc Biochemistry	Total Hours	: 39

COURSE OBJECTIVES

CO No.	To enable the students to
CO- 1	Acquaint the students with colorimetric estimations of biomolecules.
CO -2	Equip skills on various separation techniques
CO- 3	Impart knowledge about the estimation of minerals and vitamins

Colorimetry**30 HOURS**

1. Estimation of amino acid by Ninhydrin method.
2. Estimation of protein by Biuret method.
3. Estimation of DNA by Diphenylamine method.
4. Estimation of RNA by Orcinol method.
5. Estimation of Phosphorus by Fiske and Subbarow method.

Chromatography**5 HOURS**

1. Separation and identification of sugars and amino acids by paper chromatography.
2. Separation and identification of amino acids and lipids by thin layer chromatography.

Demonstration**4 HOURS**

1. Separation of serum and plasma from blood by centrifugation.
2. Separation of serum proteins by SDS-PAGE.

Text books

- J. Jayaraman, (2015). *Laboratory Manual in Biochemistry New Age International (P) Limited* (5TH edition)
- S.Sadasivama.Manickam (2018) *Biochemical Methods Newage International*

PvtLtd publishers(3rd edition)

Reference books

- S. K. Sawhney and Randhir Singh, (2005) *Introductory Practical Biochemistry*. Alpha Science International, Ltd 2nd edition.
- David T. Plummer, (2001), *An Introduction to Practical Biochemistry* Tata McGraw- Hill publishing company limited 3rd edition
- Alan H Gowenlock, (2022). *Varley's Practical Clinical Biochemistry* published by CBS Publishers and distributors, India 6th edition.

e-Books

- <https://www.pdfdrive.com/biochemistry-books.html>
- <https://ttk.elte.hu/dstore/document/871/book.pdf>

Course Outcomes

CO NO.	On completion of this course, students will be able to	Bloom's Level
CO-1	Estimate the amount of biomolecules by Colorimetric method.	K1,K2
CO-2	Quantify the amount of minerals by Colorimetric method	K3
CO-3	Separate and identify sugars, lipids and amino acids by chromatography	K4
CO-4	Operate centrifuge for the separation of serum and plasma	K5
CO-5	Demonstrate the separation of proteins electrophoretically	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	3	3	2	3	1	2
CO3	3	3	2	2	1	2
CO4	3	3	2	2	1	2
CO5	3	3	3	3	3	3

High correlation: 53% Medium correlation: 33% Low correlation: 14%

BASICS OF FORENSIC SCIENCE

(UBCD401)

Semester : IV
Category : SEC/DSC
Class & Major : II B.Sc Biochemistry

Credits : 2
Hours / week : 2
Total Hours : 26

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Gain knowledge on the basic practices of forensic analysis.
CO -2	Perform investigation using fresh blood.
CO-3	Carry out the analysis using body fluids.
CO -4	Investigate the presence of forms of drugs and poisons in body fluids.
CO -5	Execute the identification test on multiple samples.

UNIT I: FORENSIC SCIENCE

6 Hours

Forensic Science: Definition, History and Development. Crime scene management and investigation; collection, preservation, packing and forwarding of physical and trace evidences for analysis.

UNIT II: BLOOD GROUPING AND TYPING

5 Hours

Blood - grouping and typing of fresh blood samples including enzyme. Cases of disputed paternity and maternity problems, DNA profiling.

UNIT III: ANALYSIS OF BODY FLUIDS

5 Hours

Analysis of body fluids-Analysis of illicit liquor including methyl and ethyl alcohol in body fluids and breathe. Chemical examination, physiology and pharmacology of Insecticides and pesticides.

UNIT IV: PSYCHOTROPIC DRUGS

5 Hours

Psychotropic drugs-Sedatives, stimulants, opiates and drugs of abuse. Identification of poisons from viscera, tissues and body fluids.

UNIT V: EXAMINATION AND IDENTIFICATION TEST

5 Hours

Identification tests-Identification of hair, determination of species origin, sex, site and individual identification from hair. Classification and identification of fibers. Examination and identification of saliva, milk, urine and faecal matter

Text Books

- Saferstein: (2004) *Criminalistics -An introduction to Forensic Science*, Prentice Hall inc. USA. (8th Edition)
- James, S.H. and Nordby, J.J.; *Forensic science: An introduction to scientific and*

investigative techniques, CRC press, USA (2003)

Reference books

- Norah Rudin & Keith Inman, (2002) *An Introduction to Forensic DNA Analysis*(2nd Edition), USA.
- Richard E, (2020) *Forensic Science Handbook*, Volume 2 & 3 by Saferstein,.
- Allan D, (2015) *Forensics by Embar-Seddon*, Ayn and Pass.
- Howard C & Kobilinsky (2007), *Forensic Medicine by Adelman*, Lawrence

e-Books

- <https://librarymohsin.files.wordpress.com/2018/07/forensic-biology-2nd-ed.pdf>
- <https://www.richlandlibrary.com/catalog/detail/2024712>

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Enumerate the basic concepts and practices of Forensic Science.	K1
CO-2	Explain the forensic Science principles, including Blood Grouping and Typing of fresh blood, Analysis of Body Fluids, Psychotropic Drugs, and Identification Tests.	K2
CO-3	Apply the forensic science principles and techniques in identifying blood, body fluids, tissues and hair of individuals.	K3
CO-4	Analyze the drugs and poisons from tissues and body fluids.	K4
CO-5	Evaluate evidence and applications in forensic techniques.	K5

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	1	1	3
CO2	1	2	2	1	2	3
CO3	1	2	2	1	2	3
CO4	1	2	2	1	2	3
CO5	1	2	2	1	2	3

High correlation: 17% Medium correlation: 43% Low correlation: 40%

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core I / DSC - I	UBCM306	Biomolecules	Seminar	Album Preparation
	Allied III/ GE -III	UMBA301	Allied Microbiology	Seminar	Assignment
	SEC III / Entrepreneurial	UBCU301	Medical Laboratory Technology	Seminar	Case Study
	SEC IV	UBCD302	Biomedical Instrumentation	Model Preparation	Experiential Learning
IV	Core IV / DSC – IV	UBCM405	Biochemical Techniques	Seminar	Assignment
	SEC/DSC	UBCD401	Basics of Forensic Science	Seminar	Assignment

PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY

PREAMBLE:

PG: Programme profile & the syllabi of courses offered in semester III and IV along with III and IV evaluation components (with effect from 2023 – 2025 batch onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO) – M.Sc., BIOCHEMISTRY

PSO No.	On completion of this programme, students will be able to
PSO-1	Acquire in-depth knowledge in courses like cell biology, enzymology, biotechnology, metabolism, endocrinology, immunology, genetics, genetic engineering and clinical biochemistry.
PSO-2	Detect various disorders and identify the defect in the metabolic pathways and evaluate solutions for metabolic disorders by applying the knowledge of metabolism.
PSO-3	Undertake biochemical experiments using classical and modern instruments of biochemistry & molecular biology, record and interpret the results, draw conclusions.
PSO-4	Explore the leadership skills to manage projects in multidisciplinary and interdisciplinary courses and develop skills beyond the syllabus as an individual to become a successful entrepreneur through PG Service learning.
PSO-5	Instill knowledge and awareness on professional ethics, bioethical and health issues, intellectual property rights and become life-long learner through professional courses such as IPR, biosafety and bioethics
PSO-6	Develop research experience by identifying the problem, analyse, interpret and draw conclusions on social cause through innovative PG project in adherence to ethical standards.

PROGRAMME PROFILE OF M.Sc BIOCHEMISTRY

Semester	Category	Course code	Course title	Contact Hours / Week	Credit
					Min/Max
I	Core I	PBCM111	Basics of Biochemistry	5	4
	Core Elective I	PBCO101	Biochemical and Molecular Biology Techniques	5	3
	Core Elective II	PBCO102	Physiology and Cell Biology	5	3
	Core Practical I	PBCR104	Laboratory Course in Cell Biology, Biochemistry and Biochemical Techniques	10	8
	Skill Enhancement Course NME	---	Non Major Elective	3	2
	Online Course	---	NPTEL	2	2
TOTAL				30	22
II	Core II	PBCM211	Enzymology	5	4
	Core Industry - III	PBCM212	Clinical Biochemistry	4	3

	Core Elective III	PBCO201	Cellular Metabolism	4	3
	Core Elective IV	PBCO202	Bioinformatics	3	3
	Core Practical II	PBCR204	Laboratory Course in Immunology and Enzymology	10	8
	Skill Enhancement Course- DSC	PBCD201	Advanced Immunology	4	2
	Service Learning (Outside the class room)	PBCX201	(Service Learning)	-	1
	Internship/Industrial training/Field visit	PINS201	-	-	2
TOTAL				30	26
III	Core IV	PBCM307	Molecular Biology	5	4
	Core Industry - V	PBCM308	Industrial Microbiology	4	3
	Core Elective - V	PBCO301	Gene Editing, Stem Cell and Gene Therapy	4	3
	Core Elective – VI	PBCO302	Molecular Endocrinology & Signaling	3	3
	Core Practical III	PBCR303	Laboratory Course in Clinical Biochemistry and Molecular Biology	10	8
	SEC/Interdisciplinary	PBCI301	Pharmaceutical Biochemistry	4	2
TOTAL				30	23
IV	Core VI	PBCM405	Basics of Genomics & Proteomics	5	4
	Core VII	PBCM406	Biochemical Toxicology	5	4
	Core VIII	PBCM407	Biosafety, Lab Safety & IPR	5	4
	Core Elective - VII	PBCO401	Biotechnology	5	3
	Project	PBCP401	Project	6	4
	Skill Enhancement Course (Professional Competency Skill)	PBCC401	NET/SET for life science	4	2
	Internship/Industrial training/Field visit	PINS401	-	-	2
TOTAL				30	21/23
GRAND TOTAL				120	92/94

**COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVES (NME)**

Semester	Category	Course code	Course Title	Contact Hour/Week	Credit
I	Non Major Elective	PBCE105	Nutritional Biochemistry	3	3
		PBCE106	Basic Lifestyle Diseases and its Therapeutic Strategies		

MOLECULAR BIOLOGY
(PBCM307)

Semester : III
Category : Core III
Class & Major : II M.Sc Biochemistry

Credits : 4
Hours / week : 5
Total Hours : 65

COURSE OBJECTIVES:

CO No.	The students will be able to
CO -1	Understand the process of inheritance, concepts of genes, genome, chromatin and chromosomes.
CO- 2	Impart a thorough understanding of the key events of molecular biology, including the mechanisms of DNA replication, transcription and translation along with DNA repair mechanisms.
CO-3	Provide a detailed understanding of post transcriptional and posttranslational modifications and processing of eukaryotic RNA and proteins
CO- 4	Give a detailed explanation of transcriptional regulation with lac operon and tryptophan operon as examples
CO- 5	Impart adequate information of the types of regulatory RNAs along with key concepts of gene silencing

UNIT I: LAW OF INHERITANCE

13 Hours

Mendel's laws of inheritance-dominance-complete, incomplete and co- dominance, multiple alleles-gene mapping in haploids and diploids, recombination mapping- restriction mapping- modes of gene information transfer in bacterial- conjugation, transformation and transduction. The bacterial chromosome, the eukaryotic genome- chromosome structure – Histones, Nucleosome, chromatin- heterochromatin, euchromatin, chromatin remodeling, DNAase hypersensitive sites, genome organization – the C-value paradox, reassociation kinetics, repetitive sequences, gene amplification, telomeres, pseudogenes, split genes, organelle genomes – mitochondrial and chloroplast genome.

UNIT II: DNA REPLICATION AND REPAIR MECHANISM

13 Hours

DNA replication and repair: Enzymes of replication, prokaryotic replication mechanisms, primosome & replisomes, eukaryotic DNA replication, the role of topoisomerases and telomerase, regulation of replication, difference between prokaryotic and eukaryotic replication.

Mutations -Types of mutations, mechanisms of mutations, mutagenic agents. DNA repair mechanisms – Direct repair, excision repair, mismatch repair, recombination repair, SOS response, eukaryotic repair systems. Recombination and mobile genetic elements- the Holliday model, the general recombination in *E.coli*, site specific recombination, transposons and retroposons.

UNIT III: TRANSCRIPTION & TRANSLATION

13 Hours

Transcription – Prokaryotic transcription-subunits of RNA polymerase, *E. coli* promoters, sigma factor and promoter recognition, alternative sigma factors, initiation, elongation, Rho-dependent and independent termination of transcription. Eukaryotic transcription- Initiation, promoter elements, RNA polymerases, transcription factors, regulatory sequences in eukaryotic protein – coding genes, CpG islands, enhancers.

Translation – organization of the ribosome, the genetic code, evidence for a triplet code, deciphering the genetic code, wobble hypothesis, deviation in the genetic code, unusual codons. activation, initiation, elongation and termination of translation in *E. coli*. The role of tRNA and rRNA, suppressor tRNAs and inhibitors of protein synthesis. Comparison of prokaryotic translation with eukaryotic translation.

UNIT IV: GENE EXPRESSION IN PROKARYOTES & EUKARYOTES

13 Hours

Regulation of gene expression in prokaryotes— Positive and negative control, the lac operon, identification of operator and regulator sequences by mutations, induction and repression, Foot-printing and gel-shift assays for identification of protein-DNA interactions. Catabolite repression. *Trp* operon – Attenuation, alternative secondary structures of *trp* mRNA.

Regulation of gene expression in eukaryotes- Response elements, DNA-binding motifs, steroid receptors, association of methylation and histone acetylation with gene expression.

UNIT V: POST TRANSCRIPTIONAL MODIFICATIONS

13 Hours

Post transcriptional modifications in eukaryotes- RNA processing- mRNA 5' capping and 3'poly-adenylation, introns and exons, RNA splicing,- spliceosome assembly, alternative splicing, processing of tRNA and rRNA, self-splicing, ribozymes, RNA editing- substitution and insertion/deletion editing, Genome editing-CRISPR- Cas technology. Post translational modification of proteins- Proteolytic cleavage, covalent modifications, glycosylation of

proteins, disulfide bond formation, Protein sorting – signal peptides, transport of secretory proteins, Golgi and post-golgi sorting, coated vesicles, targeting of mitochondrial, lysosomal and nuclear proteins, Protein degradation-Ubiquitination of proteins, Protein folding-chaperones

Text Books

- Nelson DL, Cox MM (2017) *Lehninger Principles of Biochemistry (7th Edition)*, Freeman Publishers, New York.
- Rodwell, VW, et al. (2018) *Harper’s Illustrated Biochemistry, (31st Edition)*, McGraw Hill, New York.

Reference Books

- Watson JD et al. (2006) *Recombinant DNA: genes and chromosomes – a short course (3rd Edition)* Freeman Publishers, New York.
- Twyman R (2018) *Advanced molecular biology* Garland Science, New York.

e- Resources

- Molecular Biology Free Online Course by MIT Part 3: RNA Uploaded by edX
- <https://mooc.es/course/molecular-biology/>
- <https://learn.genetics.utah.edu/>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Relate and recall the genome structure of prokaryotes and eukaryotes and DNA replication, transcription, translation and posttranscriptional, posttranslational modifications and regulatory RNAs	K1,K2
CO-2	Identify the mechanisms of DNA replication, repair and recombination, Concepts of gene expression.	K3
CO-3	Analyze the enzymes and processes involved in RNA biosynthesis, protein biosynthesis, degradation and regulation.	K4
CO-4	Evaluate protein targeting and the role of ubiquitin in protein degradation and chaperones in folding and regulation of gene expression.	K5
CO-5	Create and design protein sequence for the research work.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	1	3
CO2	3	3	3	2	1	2
CO3	3	3	3	1	2	3
CO4	3	3	3	1	2	3
CO5	3	3	3	2	3	3

High Correlation: 60% Medium Correlation: 27% Low Correlation: 13%

INDUSTRIAL MICROBIOLOGY (PBCM308)

Semester	: III	Credit	: 3
Category	: Core Industry V	Hours/ Week	: 4
Class & Major	: II M.Sc Biochemistry	Total Hours	: 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Apprehend wider knowledge on use of microorganisms in industries
CO -2	To know various fermenter designs, culture systems and fermentation process
CO -3	Understand the production and purification of fermented products
CO -4	Comprehend the basic concepts of food and agriculture microbiology
CO- 5	Emphasize on entrepreneurship in industrial microbiology

UNIT I: INTRODUCTION

11 Hours

Structure of bacteria, fungi and viruses and their classification. Characteristics used for the classification of bacteria. Reproduction in bacteria and fungi. Types and characteristics of microorganisms used in industries – food industry, chemical industry and pharmaceutical industry.

UNIT II MICROBIAL FERMENTATION I

10 Hours

Fundamentals and principles of microbial fermentation techniques – application in pharmaceutical industry. Fermentation – types, techniques, design and operation of fermenters including addition of medium. Types and characteristics of microorganisms, environmental conditions required for the growth and metabolism of industrially and pharmaceutically important microbes. Sterilization methods in fermentation techniques, air, gas, culture medium sterilization. Steam-filtration and chemicals. Types and constituents of fermentative culture medium and conditions of fermentations, antifoaming devices.

UNIT III MICROBIAL FERMENTATION II

11 Hours

Recovery and estimation of products of fermentation- Production of ethanol, acetic acid, glycerol, acetone, butanol and citric acid by fermentation. Production of enzymes- amylase, protease, lipase, Production of pharmaceuticals by fermentation– penicillin, streptomycin, tetracycline, riboflavin, vitamin B12. Beverages-wine, beer and malt beverages

UNIT IV FOOD MICROBIOLOGY

10 Hours

Production of dairy products-bread, cheese and yoghurt (preparation and their types). Food borne diseases- bacterial and non-bacterial. Food preservation - principles–physical methods: temperature (low, high, canning, drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging, Chemical methods - salt, sugar, organic acids, SO₂, nitrite and nitrates, ethylene oxide, antibiotics and bacteriocins.

UNIT V: AGRICULTURAL MICROBIOLOGY

10 Hours

General Properties of soil, microorganisms in soil – decomposition of organic matter in soil. Biogeochemical cycles, nitrogen fixation, Production of bio fertilizers and its field applications – *Rhizobium*, *Azotobacter*, blue green algae, mycorrhizae and *Azospirillum*. Production of biofuels (biogas- methane), soil inoculants.

Text Books:

- Ratledge A, Kristiansen V (2006) *Basic Biotechnology (3rd Edition)*, Cambridge University Press, Cambridge, UK.
- Gupta PK (2010) *Elements of Biotechnology (2nd Edition)*, Rastogi Publication, New Delhi.

Reference Books:

- Flickinger E, Drew C (1999) *Encyclopedia of Biotechnology 5 volumes* John Wiley, New Jersey.
- Casida LEJR (2019) *Industrial Microbiology* New Age International, New Delhi.
- Patel AH (2022) *Industrial Microbiology*, Laxmi Publications, Chennai.

e -Books:

- https://www.academia.edu/36555620/Biotechnology_Book
- https://www.academia.edu/70504030/Nanoscience_and_Biotechnology_for_Environmental_Applications<https://nptel.ac.in/courses/126/103/126103017/>

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the basic concept of microorganisms and their role in various industries.	K1 & K2
CO-2	Apply the knowledge of microorganisms in the fermentation industry, food industry and agricultural industry.	K3
CO-3	Compare the role of different microbes and their benefits in various industries.	K4
CO-4	Evaluate the process of fermentation process, ethanol production and food preservation.	K5
CO-5	Develop new antibiotics, bio fertilizers and other agricultural products using various microorganisms.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	3	3
CO2	3	3	2	3	3	3
CO3	3	2	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	2	3	3	3	3

High Correlation: 83%

Medium Correlation: 17%

**GENE EDITING, STEM CELL AND GENE THERAPY
(PBCO301)**

Semester : III
 Category : Core Elective V
 Class & Major : II M.Sc., Biochemistry

Credit :3
 Hours/ Week :4
 Total Hours :52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Inculcate knowledge on comparing the animal models used to model genetic diseases
CO- 2	Understand the molecular basis of genetic diseases
CO- 3	Educate the therapeutic strategies in gene therapy and stem cell therapy
CO-4	Enlighten the importance of gene and cell therapy
CO -5	Emphasize the ethical considerations of gene and cell therapy

UNIT I: BASICS OF GENE EDITING**11 Hours**

Gene editing: basis of gene editing, DNA repair mechanisms, double strand DNA breaks, non-homologous end-joining (NHEJ), homology directed repair, programmable nucleases for gene

editing, meganucleases, zinc-finger nucleases, transcription activator-like effector nucleases (TALEN), CRISPR-Cas systems, gene editing using CRISPR-Cas, drawbacks and major challenges to present gene editing techniques, gene editing for human disease therapy.

UNIT II: GENE THERAPY I

10 Hours

Basics of gene and cell therapy, types of gene therapy, gene therapy strategies, therapeutic targets for gene therapy, choice of the therapeutic target, administration routes, delivery systems, expression of transgene, persistence of the gene therapy, cell targeting, immunological response to the therapy, ethical and legal issues, concerns about gene and cell therapy

UNIT III: GENE THERAPY II

11 Hours

Vectors for gene therapy: non-viral and viral vectors for gene therapy, physical methods of gene delivery, polymer, lipid and inorganic material based chemical systems for gene delivery, viral vectors, lentiviral, adenoviral, adeno-associated virus, herpes simplex virus, vaccinia, baculoviral vectors for gene delivery, choice of viral vector and oncolytic virus. gene therapy applications, gene therapy for cancer and oncolytic gene therapy.

UNIT IV: STEM CELL

10 Hours

Stem cells and tissue regeneration: adult and fetal stem cells, embryonic stem cells, cell reprogramming, induced pluripotent stem cells (iPSC), chemically induced pluripotent stem cells (CiPSC), reprogramming factors, iPSC derived progenitor cells, organoids, three dimensional (3D) bioprinting.

UNIT V: ETHICAL ISSUES OF GENE AND CELL THERAPY

10 Hours

Regulatory and ethical considerations of stem cell and gene therapy, pluripotent stem cell-based cell replacement therapies. Assessing human stem cell safety, use of genetically modified stem cells in experimental gene therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies.

Text Books

- Pastrnek JJ (2005) *An introduction to human molecular genetics: mechanisms of inherited diseases (2nd Edition)*, Wiley, New Jersey.
- Kresina TF (2002) *An introduction to molecular medicine and gene therapy (1st Edition)* Wiley, New Jersey.

Reference Books

- Marshak DR et al. (2001) *Stem cell biology* Cold Spring Harbor Laboratory Press, New York
- Battler A (2006) *Stem cell and gene-based therapy* Springer, Berlin.
- Aranha H, Vega-Mercado H (2023) *Handbook of cell and gene therapy: from proof-of-concept through manufacturing to commercialization* CRC Press, Boca Raton.
- Nobrega C et al. (2020) *A handbook of gene and cell therapy*, Springer, Berlin.

e- Books

- https://web.stanford.edu/~msanyal/PDF/2012_Smarcal1_Human_Molecular_Genetics.pdf
- https://www.mlsu.ac.in/econtents/47_00%20gene%20therapy.pdf
- <https://books.google.co.in/books?id=-oKsEAAAQBAJ&printsec=frontcover#v=onepage&q&f=false>

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the fundamental concepts of immune therapy, gene therapy and cell therapy	K1 & K2
CO-2	State the strategies of gene cloning and the applications of gene delivery vectors	K3
CO-3	Understand the nature of diseases where in gene therapy and stem cell therapy can be applied	K4
CO-4	Identify knowledge gaps of immune therapy, gene therapy and stem cell therapy	K5
CO-5	Evaluate the ethical aspects of the gene therapeutic technologies.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	3	2	3	3
CO-2	2	2	3	3	3	3
CO-3	3	3	3	2	3	1
CO-4	3	3	3	3	3	3
CO-5	3	2	3	2	3	3

High Correlation: 73%

Medium Correlation: 23%

Low Correlation: 04%

MOLECULAR ENDOCRINOLOGY AND SIGNALING

(PBCO302)

Semester : III
Category : Core Elective VI
Class & Major : II M.Sc Biochemistry

Credit :3
Hours/ Week :3
Total Hours :39

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Inculcate knowledge about hypothalamic and pituitary hormones
CO -2	Comprehend the functions of thyroid and parathyroid hormones
CO- 3	Inculcate knowledge about the mechanisms of actions of adrenal hormones
CO- 4	Elucidate about the molecular mechanisms of gonadal and pancreatic hormones
CO -5	Inculcate knowledge about signal transduction

UNIT I: HYPOTHALAMIC AND PITUITARY HORMONES

7 Hours

Classification of hormones. Hypothalamic and pituitary hormones. Hypothalamic releasing factors. Anterior pituitary hormones: biological actions, regulation and disorders of growth hormone, ACTH, gonadotropins and prolactin. Leptin.

Posterior pituitary hormones - biological actions of vasopressin. Diabetes insipidus and syndrome of inappropriate ADH secretion (SIADH) Oxytocin. Hypopituitarism.

UNIT II: THYROID AND PARATHYROID HORMONES

8 Hours

Thyroid hormones - synthesis, secretion, regulation, transport, metabolic fate and biological actions. Hyper and hypothyroidism. Hormonal regulation of calcium and phosphate metabolism. Secretion and biological actions of PTH, calcitonin and calcitriol. Hypercalcemia and hypocalcemia.

UNIT III: ADRENAL HORMONES

8 Hours

Adrenal cortical hormones. Synthesis, regulation, transport, metabolism and biological effects of glucocorticoids and mineralocorticoids. Hypo and hyper function - Cushing's syndrome, aldosteronism, CAH, adrenal cortical insufficiency, Addison's disease. Adrenal medullary hormones - synthesis, secretion, metabolism, regulation and biological effects of catecholamines.

UNIT IV: GONADAL, GASTROINTESTINAL AND PANCREATIC HORMONES

8 Hours

Gonadal hormones: Biosynthesis, regulation, transport, metabolism and biological actions of androgens. Biosynthesis, regulation, transport, metabolism and biological effects of oestrogen and

progesterone.. Pancreatic hormones - synthesis, regulation, biological effects and mechanism of action of glucagon& Insulin, somatostatin. gastrointestinal hormones- gastrin secretin.

UNIT V: SIGNAL TRANSDUCTION

8 Hours

Fundamental concepts and general features of cell signalling. Endocrine, paracrine, autocrine and juxtacrine signaling. Types of receptors. Transmembrane, nuclear and cytosolic receptors. G-protein-coupled receptors. Second messengers: c-AMP, cGMP, inositol triphosphate and Ca²⁺. Receptor tyrosine kinases - insulin signalling, ras-raf-MAP kinase and JAK-STAT pathways.

Text Books

- Melmed S et al, (2015) *Williams Text Book of Endocrinology*, (13th Edition), Elsevier, Berlin, Germany.
- Rodwell VW et al. (2018) *Harper's Illustrated Biochemistry*, (31st Edition), McGraw Hill, New York.

Reference Books

- Kleine B, Rossmanith WG (2016) *Hormones and the Endocrine System: Textbook of Endocrinology*, Springer, New York.
- Robertson P (2023) *DeGroot's Endocrinology* Volume I and II Elsevier, Amsterdam.

e- Books

- <https://www.uc.edu/content/dam/uc/ce/docs/The%20Endocrine%20System.pdf>
- <https://pubs.niaaa.nih.gov/publications/arh22-3/153.pdf>
- [http://www.uop.edu.pk/ocontents/Lec%20no%203\(3\).pdf](http://www.uop.edu.pk/ocontents/Lec%20no%203(3).pdf)

COURSE OUTCOMES:

CO No.	On completion of the course , the student will be able to	Bloom's Level
CO-1	Understand the role of hypothalamo-pituitary axis in the coordination of nervous and endocrine system	K1 & K2
CO-2	Explain the functions pituitary, thyroid and parathyroid secretions and associated disorders	K3
CO-3	Examine an understanding of the actions of adrenal and gonadal, gastrointestinal tract and pancreatic hormones and disorders associated with their hypo and hyper secretion	K4
CO-4	Evaluate the different types of signaling, ligand –receptor interaction, cellular messengers of hormones and response pathways triggered by hormonal stimuli	K5
CO-5	Discuss the interrelationships and regulation of signal transduction mechanism	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	2	3	3
CO-2	3	3	2	3	3	3
CO-3	3	3	1	2	2	3
CO-4	3	3	1	3	2	3
CO-5	3	3	1	3	2	3

High Correlation: 70% Medium Correlation: 20% Low Correlation: 10%

LABORATORY COURSE IN CLINICAL BIOCHEMISTRY AND MOLECULAR BIOLOGY (PBCR303)

Semester : III
Category : Core Practical III
Class & Major : II M.Sc., Biochemistry

Credit :8
Hours/ Week :10
Total Hours :130

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Instil skill on clinical approach, normal values and clinical interpretations
CO -2	Evaluate lipid profile and assess their relationship with cardiac function
CO -3	Assess liver function and markers of liver
CO -4	Perform urea clearance test to assess renal function
CO-5	Understand the principle, instrumentation and advantages of auto analyzer

Clinical Biochemistry

I Hematology

1. RBC count, WBC count, total and differential count, ESR, PCV, MCV, bleeding time and clotting time
2. Estimation of hemoglobin

II Liver function test (any three)

1. Estimation of bilirubin – direct and indirect
2. Estimation of plasma protein, A/G ratio
3. Thymol turbidity test, prothrombin time
4. Assay of alanine transaminase, aspartate transaminase and γ -glutamyl transferase

5. Separation of LDH isoenzyme by electrophoresis

III Renal function test

1. Qualitative tests for normal and pathological components of urine
2. BUN – estimation of blood urea, creatinine and uric acid

IV Estimation of blood constituents (any five)

1. Blood glucose
2. Serum uric acid.
3. Serum creatinine.
4. Serum cholesterol
5. Serum phospholipid
6. Serum triglycerides
7. Serum free fatty acids
8. Serum iron.
9. Serum inorganic phosphorus.
10. Serum alkaline phosphatase

V Group experiments

1. Antigen-antibody reaction – HCG kit method, RA kit method
2. Phlebotomy – venipuncture, different techniques of venipuncture
3. Automation in clinical biochemistry – autoanalyzer and semi-autoanalyser

Molecular Biology (any two)

1. Isolation of bacterial chromosomal and plasmid DNA and characterization by electrophoresis
2. DNA electrophoresis in agarose gel and isolation of RNA
3. RNA isolation and cDNA synthesis

Demonstration

1. Separation of proteins by SDS-PAGE and Western hybridization
2. DNA electrophoresis in agarose gel and Southern hybridization
3. RT-PCR
4. Real-time qPCR

Text Books

- Plummer DT (2006) *An introduction to Practical Biochemistry, (3rd Edition)*, Tata McGraw Hill, New Delhi.

- Varley H et al. (2022) *Practical Clinical Biochemistry. (6th Edition)*, CBS Publishers, New Delhi.

e- Books

- <https://www.researchgate.net/publication/260182512>
- https://main.icmr.nic.in/sites/default/files/upload_documents/GCLP_Guidelines_2020_Final.pdf<https://www.westgard.com/cli.html>

COURSE OUTCOMES:

CO No.	On completion of the course ,the student will be able to	Bloom's Level
CO-1	Describe the principles associated with the biochemical measurements performed in clinical laboratory	K1&K2
CO-2	Quantitatively analyze blood constituents and assay enzymes of diagnostic importance	K3
CO-3	Interpret the result patterns in relation to normal level.	K4
CO-4	Acquire knowledge to interpret electrolyte concentration in serum	K5

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	2	3	3
CO-2	3	3	2	3	3	3
CO-3	3	3	1	2	2	3
CO-4	3	3	1	3	2	3
CO-5	3	3	1	3	2	3

High Correlation: 70%

Medium Correlation: 20%

Low Correlation: 10%

**PHARMACEUTICAL BIOCHEMISTRY
(PBCI301)**

Semester : III
Category : SEC/ Interdisciplinary
Class &Major : II M.Sc Biochemistry

Credit :2
Hours/ Week :4
Total Hours :52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO- 1	Understand the different types of bioinformatics tools for drug discovery
CO -2	Comprehend the drug-target identification, drug screening and structure-activity relationship
CO- 3	Assimilate knowledge on different drug metabolic pathways and drug elimination
CO- 4	Inculcate mode of action of drugs
CO -5	Elucidate the guidelines and regulations of phase I, II and III trials

UNIT I: BASICS OF DRUG DEVELOPMENT**10 Hours**

Drug discovery and development, drug target identification and validation, hit identification, general principles of screening, correlations between various animal models and human situations, correlation between *in vitro* and *in vivo* screens; special emphasis on cell-based assay, biochemical assay, radiological binding assay, pharmacological assay, *in vitro*, *in vivo* and *ex vivo* experiments, lead optimization, preclinical studies.

UNIT II: BIOINFORMATICS AND DRUG DEVELOPMENT**11 Hours**

Bioinformatics approaches for drug development - identification of potential molecules, chemical compound library preparation, Identification of target in pathogen, ligand and protein preparation, molecular docking, binding free energy estimation, high throughput virtual screening, docking protocol validation and enrichment analysis, single point energy calculation, pharmacokinetics and pharmacodynamics, ADME and toxicity prediction, molecular dynamic simulation, rule of three and five, Lipinsky rule, pharmacophore development, quantitative structure activity relationship, 3D-QSAR, techniques of developing a pharmacophore map covering both ligand based and receptor based approaches.

UNIT III: METABOLISM OF DRUGS**11 Hours**

Drug metabolism and interactions - drug-receptor interactions, receptor theories and drug action, xenobiotics, xenobiotics phases (phase-I, phase-II and phase-III), role of cytochrome P450 oxidases and glutathione S-transferases in drug metabolism, factors affecting drug metabolism, enzymes as a drug target, kinase inhibitors, ATPase inhibitors, drug protein interaction, drug-DNA interaction. basic ligand concepts-agonist, antagonist, partial agonist, inverse agonist, efficiency and potency. Forces involved in drug-receptor complexes. Receptor classification – the four super families. Receptor binding assays- measurement of K_d, B_{max} and IC₅₀.

UNIT IV: MODE OF ACTION OF DRUGS**10 Hours**

Biochemical mode of action of antibiotics- penicillin and chloramphenicol, actions of alkaloids, antiviral and antimalarial substances. Biochemical mechanism of drug resistance-sulphonamides. Drug potency and drug efficacy. General principles of chemotherapy: chemotherapy of parasitic infections, fungal infections, viral diseases. Introduction to immunomodulators and chemotherapy of cancer.

UNIT V: CLINICAL TRIALS

10 Hours

Clinical trials (phase-I, phase-II, phase-III and phase-IV). Main features of clinical trials, including methodological and organizational considerations and the principles of trial conduct and reporting. Key designs surrounding design, sample size, delivery and assessment of clinical trials.

Text Books:

- Patrick G (2013) *Introduction to medical chemistry (5th Edition)*, Oxford University Press, London.
- Smith HS, Williams H (2005) *Introduction to the principles of drug design and drug action (4th Edition)*, CRC Press, Boca Raton.

Reference Books

- Kenakin T (2012) *Pharmacology in drug discovery (1st Edition)*, Elsevier, Amsterdam.
- Grant C (2022) *Pharmaceutical Biochemistry* ED Tech Press, London.

e -Books

- <https://www.researchgate.net/publication/352836248> Pharmaceutical Biochemistry
- https://www.academia.edu/26924019/Laboratory_Manual_in_Pharmaceutical_Biochemistry
- <https://pharmareview.files.wordpress.com/2015/03/biopharmaceuticals>

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the basic concepts of Bioinformatics in drug development	K1 & K2
CO-2	Apply the knowledge of different drug delivery mechanism and regulations	K3
CO-3	Analyze the various drug target, mode of action and delivery mechanisms and their interactions	K4
CO-4	Determine the role of guidelines and regulations of phase I, II and III of drug trials	K5
CO-5	Develop the different types of bioinformatics tools for drug discovery	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	1	1	1	1
CO2	3	2	2	1	2	2
CO3	2	3	2	0	3	3
CO4	2	3	2	3	3	3
CO5	2	3	2	3	3	3

High Correlation: 40% Medium Correlation: 40% Low Correlation: 17% No Correlation: 03%

**BASICS OF GENOMICS & PROTEOMICS
(PBCM405)**

Semester : IV
Category : Core VI
Class & Major : II M.Sc Biochemistry

Credits : 4
Hours/week : 5
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Gain knowledge on genomics and gene mapping
CO-2	Understand the mechanism of genome projects
CO-3	Highlight the importance of protein separation
CO-4	Impart knowledge on structural and functional proteomics
CO-5	Familiarize about BLAST, FASTA and protein structure database

UNIT I: GENOME MAPPING AND SEQUENCING

13 Hours

Definition of genome and genomics. Types of gene map-genetic, cytogenetic and physical. Molecular markers for mapping-RFLPs, microsatellites and SNPs. Physical mapping - in situ hybridization, STG mapping. Chromosome walking and jumping. Genome sequencing approaches: whole-genome shotgun, hierarchical shotgun.

UNIT II: NGS, GENOME PROJECTS, POST-GENOME ANALYSIS

13 Hours

Next-Generation Sequencing. Exome sequencing. Genome annotation - ORF scanning, Tilign array, Similarity searchers. Genome projects – Sequence data of *E.coli* and *D.melanogaster*. The Human Genome Project: goals, sequencing technologies, results, potential benefits, ethical, legal and social issues (ELSI). Post-genome analysis- microarrays, transcriptome, ChIPs, knock-out analysis, genome editing – CRISPR/Cas9

UNIT III: PROTEIN SEPARATION, IDENTIFICATION AND QUANTITATION 13 Hours

Proteomics - introduction. Protein separation - general principles. 2D-gel electrophoresis, liquid-liquid chromatography. Protein identification by antibodies, Edman degradation, mass spectrometry-basic principle and instrumentation, ESI, MALDI-TOF, SELDI-TOF, tandem MS. Peptide mass fingerprinting (elementary details).

UNIT IV: STRUCTURAL & FUNCTIONAL PROTEOMICS & APPLICATIONS 13 Hours

Structural proteomics: X-ray and NMR for protein structure analysis. Comparative and homology modeling, secondary structure prediction, fold recognition and Ab initio prediction. SCOP. Protein sequence analysis: substitution score matrices, pair wise similarity search, pattern recognition. Protein function determination: database search for homology. Protein-protein interactions: yeast 2- hybrid system, protein arrays and chips (concept and applications). Applications of proteomics protein mining, protein expression profiling and mapping protein-network, co-immuno precipitation, pull down assay, drug diagnostics, and drug discovery.

UNIT-V BIOINFORMATICS

13 Hours

Useful search engines. File formats. PubMed. Bioinformatics workstation, Unix. Biological databases (primary, secondary, organism - specific, miscellaneous). Data submission and retrieval. Sequence alignment: substitution scores and gap penalties. Database similarity searching: BLAST, FASTA. Multiple sequence alignments: CLUSTAL. Gene discovery and prediction. Molecular phylogenetics: phylogenetic tree construction and analysis. Identification of orthologs and paralogs. Protein structure database-protein structure visualization, comparison and classification. Protein motifs and domain prediction. NGS data analysis.

Text Books

- Lesk A (2014). *Introduction to Bioinformatics(4th edition)*, OUP.
- Primrose(2002). *Principles of Genome Analysis(3rd edition)*, Wiley.
- T.A. Brown(2007). *Genomes(4th edition)*. Garland Science.
- Hartwell *et al.*,(2014) *Genetics: From Genes to Genomes (5th edition)*.
- Twyman(2013). *Principles of Proteomics (2nd edition)*.

Reference Books

- Gibas and Per Jambeck (2013). *Developing Bioinformatics Computer Skills (2nd edition)*. O'Reilly Associates.
- Baxevanis, Ouellette (2004). *Bioinformatics. A Practical Guide to the Analysis of Genes and Proteins. (3rd edition)*, Wiley Interscience.

e- Resources

- https://books.google.co.in/books?id=xYmcAQAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- https://www.google.co.in/books/edition/Genome_Editing_Tools_and_Gene_Drives/fC1AEAAAQBAJ?hl=en&gbpv=1&dq=Genomes+4+//Genomes+4+//&printsec=frontcover

COURSE OUTCOMES:

CO No.	On completion of this course, the students will be able to	Bloom's Level
CO-1	Understand the types and uses of gene mapping, molecular markers for mapping and classical and new generation genome sequencing approaches	K1&K2
CO-2	Comprehend genome projects, post-genome analysis and ELSI	K3
CO-3	Apply the modern methods for separation, identification ,quantitation and structural analysis of proteins	K4
CO-4	Retrieve, align, analyze and interpret sequence and structural data from databases	K5
CO-5	Construct the phylogenetic tree of different sequences and apply database information for molecular modelling.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	3	2	2	3	3
CO3	2	3	2	2	3	3
CO4	2	3	2	2	3	3
CO5	2	3	2	3	3	3

High Correlation: 57% Medium Correlation: 43%

BIOCHEMICAL TOXICOLOGY
(PBCM 406)

Semester : IV
 Category : Core VII
 Class & Major : II M.Sc Biochemistry

Credit :4
 Hours/ Week :5
 Total Hours :65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Understand the different types of toxins and their actions
CO- 2	Comprehend the fundamentals of toxicology and dose-response relationships
CO- 3	Assimilate knowledge on toxin testing protocols based on <i>in vivo</i> and animal systems
CO -4	Emphasize the underlying mechanisms of cellular toxicity
CO -5	Inculcate knowledge about the toxicity to various organs of the body

UNIT I: INTRODUCTION

13 Hours

Fundamentals of toxicology and dose-response relationships - introduction, biomarkers criteria of toxicity, new technologies for evaluation of toxicity interactions; dose response; measurement of dose-response relationships, linear dose response, hormesis; hazard and risk assessment, duration and frequency of exposure and effect

UNIT II: TOXIC RESPONSES

13 Hours

Factors affecting toxic responses: disposition: absorption, sites of absorption, distribution, excretion; metabolism, types of metabolic change, phase I and phase 2 reactions; control of metabolism, toxication vs. detoxication.

UNIT III: TOXICITY I

13 Hours

Toxicity testing; test protocol, genetic toxicity testing and mutagenesis assay: *in vitro* test systems: bacterial mutation tests-reversion test, Ames test, fluctuation test, and eukaryotic mutation test. *In vivo* test system, mammalian mutation test-host mediated assay and dominant lethal test. Biochemical basis of toxicity: mechanism of toxicity: disturbance of excitable membrane function, altered calcium homeostasis, covalent binding to cellular macromolecules and genotoxicity, tissue specific toxicity

UNIT IV: TOXICITY II

13 Hours

Toxic responses to foreign compounds - direct toxic action, tissue lesions; mechanism and response in cellular toxicity, pharmacological, physiological and biochemical effects; developmental toxicology- teratogenesis; immunotoxicity, genetic Toxicity; chemical Carcinogenesis

UNIT V: ORGAN TOXICITY**13 Hours**

Biochemical mechanisms of toxicity: tissue lesions: liver necrosis; kidney Damage; lung damage, liver damage, cardiac damage; neurotoxicity; exaggerated and unwanted pharmacological effects; physiological effects; biochemical effects: lethal synthesis and incorporation, interaction with specific protein receptors; teratogenesis; immunotoxicity; multi-organ Toxicity

Text Books

- Stine KE, Brown TM (2015) *Principles of toxicology (3rd Edition)*,. CRC Press, Boca Raton.
- Timbrell JA (2009) *Principles of biochemical toxicology (4th Edition)*, CRC Press, Boca Raton.
- Zakrzewski SF (2002) *Environmental toxicology, (3rd Edition)*, Oxford University Press, Oxford.

Reference Books

- Faqi AS (2017) *A comprehensive guide to toxicology in nonclinical drug development (2nd Edition)*, Academic Press, London.
- Hodgson E (2010) *A textbook of modern toxicology (4th Edition)*, Wiley, New Jersey.

e- Books

- <https://www.atsdr.cdc.gov/training/toxmanual/pdf/module-1.pdf>
- <https://www.fda.gov/media/71542/download>
- <https://www.cartercenter.org/resources/pdfs/health/ephti/library/>

Course Outcome:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Appreciate the role of toxicological biomarkers	K1 & K2
CO-2	Explain the role of disposition of toxins in human system	K3
CO-3	Evaluate the drug disposition mechanisms and associated drug toxicities	K4
CO-4	Apprehend the toxicological response in various systems of body.	K5
CO-5	Link the mechanism of toxicity and clinical systems	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	3	2	2	3	3
CO3	2	3	2	2	3	3
CO4	2	3	2	2	3	3
CO5	2	3	2	3	3	3

High Correlation: 57% Medium Correlation: 43%

**BIOSAFETY, LAB SAFETY AND IPR
(PBCM 407)**

Semester	: IV	Credit	:4
Category	: Core VIII	Hours/ Week	:5
Class &Major	: II M.Sc Biochemistry	Total Hours	:65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO -1	Assimilate the hazards associated with the handling of biological and chemical agents.
CO -2	Understand how to protect from the hazards by the implementation of various safety measures in biochemical laboratories.
CO- 3	Implicate the importance of protecting the scientific intellect by filing patent and understand the various offices for filing and maintaining patents
CO -4	Understand the scope of patenting in biological research.
CO -5	Create an awareness of ethics associated with used of genetically modified organisms/cells and its rationale for use in living organisms

UNIT I BIOSAFETY**13 Hours**

Biosafety: Historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; recommended biosafety levels for infectious agents and infected animals; biosafety guidelines - government of India, roles of IBSC, RCGM, GEAC etc. for GMO applications in food and agriculture; environmental release of GMOs; risk assessment; risk management and communication; national regulations and international agreements.

UNIT II LABORATORY SAFETY**13 Hours**

Laboratory safety - Chemical, electrical and fire hazards; handling and manipulating human or animal cells and tissues, toxic, corrosive or mutagenic solvents and reagents; mouth pipetting, and inhalation exposures to infectious aerosols, Safe handling of syringe needles or

other contaminated sharps, spills and splashes onto skin and mucous membranes. Health aspects; toxicology, allergenicity, antibiotic resistance. Laboratory security and emergency response and administrative controls

UNIT III INTELLECTUAL PROPERTY RIGHTS (IPR)

13 Hours

Intellectual Property Rights (IPR): Introduction to patents, types of patents, process involved in patenting in India, trademarks, copyright, industrial design, trade secrets, traditional knowledge, geographical indications, history of national and international treaties and conventions on patents, WTO, GATT, WIPO, Budapest Treaty, Patent Cooperation Treaty (PCT) and TRIPS.. The patentability of microorganisms-claims, Characterization and repeatability disposition in the culture collections, legal protection for plants and other higher organisms, new plant varieties by rights, tissue culture protocols, patent database.

UNIT IV PATENT FILING AND INFRINGEMENT

13 Hours

Patent filing and infringement: Patent application- forms and guidelines, fee structure, time frames; types of patent applications: provisional and complete specifications; PCT and convention patent applications, International patenting-requirement, financial assistance for patenting-introduction to existing schemes; Publication of patents-gazette of India, status in Europe and US. Research Patenting: Patenting by researchers and scientists-University/organizational rules in India and abroad. Detailed information on patenting biological products, Case studies on patents (basmati rice, turmeric, neem etc.), and patent infringement

UNIT V BIOETHICS

13 Hours

Introduction to bioethics, human genome project and its ethical issues, genetic manipulations and their ethical issues, ethical issues in GMOs, foods and crops in developed and developing countries, environmental release of GMOs, ethical issues involved in stem cell research and use, use of animals in research experiments, animal cloning, human cloning and their ethical aspects, testing of drugs on human volunteers

Text Books:

- *Biosafety in Microbiological and Biomedical Laboratories*, (2020) (https://www.cdc.gov/labs/pdf/SF_19_308133-A_BMBL6_00-BOOK-WEB-final3.pdf)
- Kankanala C., (2007), *Genetic Patent Law & Strategy*, (1st Edition), Manupatra Information Solution Pvt. Ltd.,.

Reference Books:

- V. Shree Krishna, (2007). *Bioethics and Biosafety in Biotechnology*, New Age International Pvt. Ltd. Publishers. (Unit III, Unit IV and Unit V)
- Deepa Goel, Shomini Parashar, (2013). *IPR, Biosafety and Bioethics*, Pearson. (Unit II)
- R. Ian Freshney, 2016. *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, (6th Edition)*, John Wiley & Blackwell.

e-Books

- <https://www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2009-P.pdf>
- https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBB1615.pdf

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand and implement various aspects of biosafety and carry out risk assessment of products in biological research	K1 & K2
CO-2	Apply the basic concepts of ethics and safety that are essential for different disciplines of science and procedures involved and protection of intellectual property and related rights.	K3
CO-3	Analyze the intellectual property rights and its implementation on the invention related to biological research.	K4
CO-4	Evaluate the statutory bodies that regulate the property rights and its validity in various countries.	K5
CO-5	Create the ethical concerns associated with biosafety processes and plans accordingly.	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	0	1	2	3	3	3
CO2	1	3	2	3	3	3
CO3	2	1	1	3	3	3
CO4	0	1	2	3	3	3
CO5	2	2	2	3	3	3

High Correlation: 53% Medium Correlation: 23% Low Correlation: 17% No Correlation : 7%

BIOTECHNOLOGY
(PBCO 401)

Semester : IV
Category : Core Elective VII
Class & Major : II M.Sc Biochemistry

Credit : 3
Hours/Week : 5
Total Hours : 65

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Understand the classification, growth and cultivation of microorganisms and their industrial applications and to understand the aspects of genetic engineering.
CO-2	Provide an insight into the application of various Molecular biology techniques for industrial, environmental and agricultural management
CO-3	Inculcate knowledge about Recombinant DNA technology and its methods.
CO-4	Analyze the scope of Biotechnology in cloning strategies and transgenesis
CO-5	Educate on techniques and safety aspects in genetic engineering

UNIT I BIOREACTORS AND DOWNSTREAM PROCESSING

13 Hours

Bioprocess engineering: Isolation and screening of industrially important microbes. Maintenance and improvement of strains. Bioreactors - types, design, parts and their function. Media for industrial fermentation, air and media sterilization. Antifoaming devices. Types of fermentation processes: Analysis of batch, fed-batch and continuous bioreactions, analysis of mixed microbial population, specialized bioreactors (pulsed, fluidized, photobioreactors). Downstream processing: solid-liquid separation, release of intracellular compartments, concentration of biological products, purification, preservation, stabilization and product formulation.

UNIT II BIOTECHNOLOGY FOR INDUSTRIAL, ENVIRONMENTAL AND AGRICULTURAL MANAGEMENT

13 Hours

Industrial production of ethanol, lactic acid, penicillin and phenylalanine. Commercial production of fructose. Wastewater treatment - physical, chemical and biological treatment processes. Effluent treatment. Bioremediation, oil spill cleanup. Microbial mining. Biofertilizers-bacteria and blue green algae. Biopesticides in integrated pest management-*Bacillus* and *Pseudomonas* as biocontrol agents. Single cell protein-microorganisms and steps in SCP production, biomass recovery, nutritional and safety evaluation, advantages. Soil microbiota. Bio-geochemical role of soil microorganisms. Microbial degradation of xenobiotics in the environment.

UNIT III VECTORS AND GENE TRANSFER METHODS

13 Hours

Basic steps in cloning. Restriction endonucleases, cloning vectors (pBR322, pUC), phages (λ and M13), cosmids, BACs, and YACs. Methods of ligating vector and insert DNA - cohesive end method, homopolymer tailing, blunt-end ligation, linkers and adapters.

Gene transfer methods-calcium phosphate coprecipitation, electroporation, lipofection, viral vectors, microinjection. Host organisms for cloning. Recombinant screening-marker inactivation (antibiotic resistance and blue-white selection), colony hybridization, immunological screening and *in vitro* translation.

UNIT IV CLONING STRATEGIES AND TRANSGENESIS

13 Hours

Cloning strategies: Construction of genomic and cDNA libraries. Difference between genomic and cDNA libraries. Cloning of insulin gene. Expression vectors - baculovirus and mammalian expression systems (brief outline). Transgenic plant technology: Development of insect resistance, virus resistance, herbicide resistance and stress tolerant plants. Delayed fruit ripening. Terminator technology. Production of vaccines and antibodies in plants. Ethics of genetically engineered crops. Transgenic animal technology: Methods of producing transgenic animals (retroviral, microinjection, engineered stem cell). Applications of transgenic animals. Transgenic animals as models of human disease

UNIT V TECHNIQUES AND SAFETY ASPECTS IN GENETIC ENGINEERING

13 Hours

Preparation of probes. DNA sequencing. Chemical, enzymatic and automated methods. DNA fingerprinting - principle and applications. Brief outline of RFLP and FISH. PCR: basic reaction and applications. Modified PCR techniques-RT-PCR, real-time qPCR. Basic concepts of site-directed mutagenesis - directed evolution (basic concepts), Protein engineering and uses. Basic principles of gene knock-in and knock-out technology. Precise genome editing - CRISPR/Cas 9 system. The human genome project - goals, results, benefits and hazards. Synthetic biology (Brief outline). Hazards and safety aspects of genetic engineering.

Text Books

- Gupta PK, (2010) *Elements of Biotechnology*. 2nd Ed. Rastogi Publication, New Delhi.
- Dale, JW et al, (2011) *From Genes to Genomes: Concepts and applications of DNA technology*. 3rd Ed. Wiley-Blackwell, New Jersey.

Reference Books

- Winnacker, EL, (2003), *From Genes to Clones*, 4th Ed. VCH Publishers, Weinheim, Germany.
- Watson et al, (2006), *Recombinant DNA*, 3rd Ed, Scientific American Publisher, US.
- Sandy B. Primrose, Richard Twyman and Bob Old, (2002), *Principles of Gene Manipulation*, 6th Ed. Wiley, New Jersey..

e- Books

- <https://www.oecd.org/sti/emerging-tech/2097562.pdf>
- <https://www.researchgate.net/publication/284169166/Biotechnology/>
- https://www.eib.org/attachments/pj/pjbio_en.pdf

COURSE OUTCOMES:

CO No.	On completion of the course ,the student will be able to	Bloom's Level
CO-1	Recall the skills associated with growth, cultivation and screening of industrial microorganisms.	K1 & K2
CO-2	Apply the principles of the bioprocess techniques for production of industrially important compounds, SCP, biofertilizers and biopesticides and their applications.	K3
CO-3	Comprehend the methodology and applications of microbial mining and bioremediation	K4
CO-4	Apprehend the role of rDNA technology in constructing vectors and cDNA and genomic libraries	K5
CO-5	Develop new transgenic plants and foods using various recombinant technologies	K6

Course Mapping:

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO	3	1	2	3	0	3
CO2	3	0	3	3	2	3
CO3	3	1	3	2	2	3
CO4	3	2	3	3	3	3
CO5	3	2	3	2	3	3

High Correlation: 63% Medium Correlation : 23% Low Correlation: 7% No Correlation : 7%

**NET/ SET FOR LIFE SCIENCE
(PBCC401)**

Semester : IV
Category : SEC
Class & Major: II M.Sc. Biochemistry

Credits : 2
Hours/Week: 4
Total Hours : 52

COURSE OBJECTIVES:

CO No.	To enable the students to
CO-1	Acquire knowledge and skills necessary to excel in NET/SET examinations.
CO-2	Understand the fundamental concepts in biology including cell biology, genetics, molecular biology and ecology.
CO-3	Integrate knowledge across different disciplines of biology to solve complex problems.
CO-4	Present scientific data and findings in clear and organized manner.
CO-5	Practice solving previous year papers and mock tests to enhance exam taking abilitives.

UNIT- I: GENERAL APTITUDE

10 Hours

Teaching: Concept, Objectives, Levels of teaching (Memory, Understanding and Reflective), Characteristics and basic requirements. Research Aptitude: Methods of Research: Experimental, Descriptive, Historical, Qualitative and Quantitative methods. Communication: Communication: Meaning, types and characteristics of communication. Mathematical Aptitude (Fraction, Time & Distance, Ratio, Proportion and Percentage, Profit and Loss, Interest and Discounting, Averages etc). Environmental Protection Act (1986), National Action Plan on Climate Change, International agreements/efforts -Montreal Protocol, Rio Summit, Convention on Biodiversity, Kyoto Protocol, Paris Agreement, International Solar Alliance.

UNIT – II: MOLECULAR BIOLOGY & CELLULAR ORGANIZATION

10 Hours

Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons. Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors, Post- translational modification of proteins. Ramachandran plot, secondary structure, domains, motif and folds. Role of chromatin in gene expression and gene silencing.

UNIT – III: DEVELOPMENTAL BIOLOGY

11 Hours

Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination. Cell aggregation and differentiation in Dictyostelium; axes and pattern formation in Drosophila, amphibia and chick; organogenesis – vulva formation in Caenorhabditis elegans, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination.

UNIT – IV: INHERITANCE BIOLOGY**10 Hours**

Dominance, segregation, independent assortment. Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants. Inheritance of Mitochondrial and chloroplast genes, maternal inheritance. Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

UNIT – V: ECOLOGICAL PRINCIPLES, EVOLUTION AND BEHAVIOUR 11 Hours

Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemec extinctions, age structured populations. Basic concepts of ecosystem, Major terrestrial biomes; theory of island biogeography; biogeographical zones of India. Molecular tools in phylogeny, classification and identification. Population genetics – Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

Text books:

- David L.Nelson, MichaelM.Cox (2005), *Principles of Biochemistry (4thedition)*. W.H.Freeman and Company.
- Voet.D, Voet.J.G. and Pratt, C.W (2004) *Principles of Biochemistry(4thedition)*. JohnWiley & Sons,Inc.
- Zubay G.L, *et.al.*, (1995), *Principles of Biochemistry (1stedition)*. WmC Brown Publishers.
- Twyman R (2018) *Advanced molecular biology* Garland Science, New York.

Reference books:

- Avinash Upadhyay, Kakoli Upadhyay & Nirmalendu Nath (2002), *Biophysical Chemistry, Principles and Techniques, (3rd edition)*, Himalaya Publishing House.
- Rodwell, VW, et al. (2018) *Harper’s Illustrated Biochemistry, (31st Edition)*, McGraw Hill, New York.

COURSE OUTCOMES:

CO No.	On completion of the course ,the student will be able to	Bloom’s Level
CO-1	Demonstrate a comprehensive understanding of core concepts in Life sciences, including genetics, cell biology, physiology, ecology, evolution and taxonomy.	K1 & K2
CO-2	Solve complex biological problems by integrating knowledge from different disciplines within life sciences.	K3
CO-3	Discuss the impact of cutting edge research on biological sciences and society.	K4
CO-4	Completion of NET/ SET examination during course of study.	K5
CO-5	Getting trained in MCQs by attending series of mock test.	K6

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core IV	PBCM307	Molecular Biology	Seminar	e- poster Presentation
	Core Industry V	PBCM308	Industrial Microbiology	Seminar	Culture preparation
	Core Elective V	PBCO301	Gene Editing, Cell and Gene Therapy	Seminar	Poster presentation
	Core Elective VI	PBCO302	Molecular Endocrinology & Signaling	Seminar	Model presentation
	Skill Enhancement Course /Interdisciplinary	PBCI301	Pharmaceutical Biochemistry	Seminar	Poster presentation
IV	Core VI	PBCM405	Basics of Genomics & Proteomics	Seminar	Poster presentation
	Core VII	PBCM406	Biochemical Toxicology	Seminar	Case Study
	Core VIII	PBCM407	Biosafety, Lab Safety & IPR	Seminar	Chart preparation
	Core Elective VII	PBCO401	Biotechnology	Seminar	Model presentation
	SEC (Professional Competency Skill)	PBCC401	NET/ SET for Life Science	Online Assessment	Online Assessment

PG & RESEARCH DEPARTMENT OF MATHEMATICS

PREAMBLE

UG: Programme profile and the syllabi of courses offered in semester III and IV along with III and IV Evaluation Components (With effect from 2023-2026) batch onwards.

PG: Programme Profile and the Syllabi of Courses offered in the III and IV Semester along with Evaluation Components III & IV (With Effect From 2023-2025 Batch On wards)

PROGRAMME SPECIFIC OUTCOMES

PO No.	Upon completion of the B.Sc Mathematics Programme, the students will be able to
PSO-1	Understand the fundamentals of Pure and Applied Mathematics and think possibilities to for problems and find alternate solutions.
PSO-2	Demonstrate mathematical thoughts and ideas clearly and concisely to others by effective communication
PSO-3	Apply Mathematics in real life situations aiming at service to the society.
PSO-4	Analyze mathematical systems utilizing rich experiences that encourage independent, nontrivial, constructive exploration in mathematics.
PSO-5	Determine Professional and ethical responsibility that has an impact on their higher studies and Professional career.
PSO-6	Develop sound mathematics knowledge to take competitive exams and get placed

Semester	Part	Category	Course Code	Course Title	Contact Hours/w eek	Credit
						Min/Max
I	I	Tamil/Hindi/French	UTAL110/ UHIL101/ UFRL101	General Tamil-I/ Hindi-I/ French-I	5	3
	II	English	UENL111	General English – I	5	3
	III	Core Course I	UMAM110	Algebra and Trigonometry	4	4
		Core Course II	UMAM112	Differential Calculus	5	4
		Major Allied I	UMAA121	Mathematical Statistics	5	3
	IV	SEC Foundation Course	UMAF101	Bridge Mathematics	2	2
		Skill Enhancement Course (NME)	-	-	2	2
		Ability Enhancement Compulsory Course(AECC 1) Soft Skill-1	USKS103	Soft Skill	2	2
				Total	30	23

II	I	Tamil/Hindi/French	UTAL210/ UHIL201/ UFRL201	General Tamil-II/ Hindi-II/ French-II	5	3
	II	English	UENL211	General English – II	5	3
	III	Core Course III	UMAM210	Analytical Geometry (Two & Three Dimensions)	5	4
		Core Course IV	UMAM212	Integral Calculus	5	4
		Major Allied II	UPHA202	Allied Physics	4	3
		Internship	UINS201			1/2
	IV	Skill Enhancement Course (Discipline / Subject Specific)	UMAD201	Computational Mathematics	2	2
		Skill Enhancement Course (NME II)	-	-	2	2
		Ability Enhancement Compulsory Course(AECC 1) Soft Skill-II	USKS203	Soft Skill	2	2
	V	Extension Activity/ Physical Education (Outside class hours)			-	1/2
VI	Value Added Course (Outside class hours)			-	2	
Total					30	24/29
III	I	Tamil/Hindi/French	UTAL310/ UHIL301/ UFRL301	General Tamil-III/ Hindi-III/ French-III	5	3
	II	English	UENL311	General English – III	5	3
	III	Core Course V	UMAM310	Vector Calculus and Applications	4	4
		Core Course VI	UMAM312	Differential Equations and Applications	4	4
		Major Allied III	UCSA309	Programming Language with Python	4	3
	IV	Skill Enhancement Course (Discipline / Subject Specific)	UMAR311	Statistics with R Programming	2	2
		Skill Enhancement Course (Entrepreneurship)	UMA301	Mathematics For Decision Making	2	1
		Value Education	-	-	2	2
		Ability Enhancement Compulsory Course(AECC 1) Soft Skill-III	-	-	2	2
	Total					30	24
IV	I	Tamil/Hindi/French	UTAL410/ UHIL401/ UFRL401	General Tamil-IV/ Hindi-IV/ French-IV	5	3
	II	English	UENL411	General English – I	5	3

	III	Core Course VII	UMAM408	Industrial Statistics	5	4
		Core Course VIII	UMAM410	Elements of Mathematical Analysis	5	4
		Major Allied IV	UMAA412	Integral Transforms & Z Transform	4	3
		Internship	UINS401	-	-	-/2
	IV	Skill Enhancement Course (Discipline / Subject Specific)	UMAR401	Computing Mathematics	2	2
		NME-online course	-	-	2	2
		Ability Enhancement Compulsory Course (AECC 1) Soft Skill-IV			2	2
	V	Extension Activity/ Physical Education (60 Hours Compulsory)	-	-	-	-/2
	VI	Value Added Course, (Outside class hours)	-	-	-	-/2
	Total					30	23/29
V	III	Core Course IX	UMAM516	Abstract Algebra	5	4
		Core Course X	UMAM517	Real Analysis	5	4
		Core Course XI	UMAM518	Discrete Mathematics	5	4
		Core Elective V	UMAM519	Introduction to Machine Learning-Theory & Practical	5	3
		Core Elective VI	UMAM520	Optimization Techniques	4	3
		Core Course XII	UMAP601	Project	4	4
	IV	Environmental Studies			2	2
Total					30	24
VI	III	Core Course (XIII)	UMAM619	Linear Algebra	5	4
		Core Course (XIV)	UMAM620	Complex Analysis	5	4
		Core Course (XV)	UMAM621	Mechanics	5	4
		Core Elective VII	UMAM622	Programming Language with C++ with Practical	5	3
		Core Elective VIII	UMAM623	Graph Theory	6	4
		Internship	UINS601	Internship	-	-/2
	IV	Professional Competency Skill	-	-	4	2
		Comprehensive Viva - voce			-	1
V	Extension Activity			-	-/2	
VI	Value Added Course			-	-	
Total					30	22/26
Grand Total					180	140/155

COURSES OFFERED TO OTHER DEPARTMENTS-UG ALLIED

Class & Major	Semester	Category	Course Code	Course Title	Previous course code	Contact Hrs/ week	Credit
							Min/Max
II BBA	III	Allied	UMAA301	Business Statistics	UMAA211/ UMAA403/ UMAA107	4	3
II BBA	IV	Allied	UMAA410	Quantitative Techniques for Business	UMAA505	4	3
I B.Sc AI & ML	I	Allied	UMAA119	Statistical Methods and their Applications I	-	4	3
I B.Sc AI & ML	II	Allied	UMAA225	Statistical Methods and their Applications II	-	4	3
I B.SC Cyber Security	I	Allied	UMAA125	Mathematics For Computer Science – I	-	4	3
I B.SC Cyber Security	II	Allied	UMAA229	Mathematics For Computer Science - II	-	4	3
II B.Sc BioChemistry	IV	Allied	UMAA401	Bio Statistics	-	4	3
I B.Com(IAT)	III	Allied	UMAA112	Business Mathematics	-	4	3
II B.Com / II B.Com (CA)	IV	Allied	UMAA412	Business Mathematics & Statistics	-	4	3
II B.Sc Computer Science	III	Allied	UMAA311	Discrete Mathematical Structures	-	4	3

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/ Week	Credit
II	IV	Non Major Elective	UMAR201	Statistics using Excel	-	3	2
			UMAE204	Basic Mathematics for Science	-	3	2
IV			UMAE404	Mathematics for Career Development	-	3	2

VECTOR CALCULUS AND APPLICATIONS

UMAM310

Semester : III
Category : Major Core V
Class & Major : II B.Sc Mathematics

Credit : 4
Hours/Week : 4
Total Hour : 52

Course Objectives

CO No.	To enable the students
CO-1	Understand the basics of vector calculus and operations on vector functions.
CO-2	Explore the vector operator 'del' and its applications.
CO-3	Solve simple problems involving line integrals.
CO-4	Define and compute volume integrals and surface integrals.
CO-5	Apply the theorems to solve real-life problems.

UNIT –I Vector Point Function 10

Hour

Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product

UNIT – II Vector Operator 10

Hour

The vector operator 'del', The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications.

UNIT – III Laplacian operator 10

Hour

Laplacian operator, Vector identities - Line integral - simple problems.

UNIT – IV Types of Integral 10

Hour

Surface integral - Stoke's Theorem & Green's Theorem – Simple Problems

UNIT – V Applications 12

Hour

Volume integral - Gauss divergence Theorem – Applications to real life situations.

Text Book

- Duraipandian, P. and Laxmi, D. (2005). *Vector Analysis* (Revised Ed.). Emerald Publishers. Chennai.

Reference Books

- A. Gorguis, *Vector Calculus for College Students*, Xilbius Corporation, 2014.
- J.E. Marsden and A. Tromba, *Vector Calculus*, (5thedn.) W.H. Freeman, New York, 1988.
- *Differential Equation* by Dr.P.Kandasamy & Dr.K.Thilagavathy New York, 1988

Course Outcomes:

CO.No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Define and explain vector point functions.	K1&K2
CO 2	Apply the concepts of gradient, divergence, and curl to solve simple problems.	K3
CO 3	Analyze the implications of Laplacian operator in various mathematical and physical contexts.	K4
CO 4	Determine surface integrals for different types of surfaces.	K5
CO 5	Develop a strong foundation in vector calculus concepts.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	2
CO 4	3	3	3	2	2	3
CO 5	3	3	3	3	3	2

High Correlation – 83% Moderate Correlation – 17% Low Correlation - NIL

DIFFERENTIAL EQUATIONS AND APPLICATIONS

UMAM312

Semester	: III	Credit	: 4
Category	: Major Core VI	Hours/Week	: 4
Class & Major	: II B.Sc Mathematics	Total Hour	: 52

Course Objectives

CO No.	To enable the students
CO-1	Understand the concept of variable separable ordinary differential equations.
CO-2	Develop a solid understanding of first-order ordinary differential equations.
CO-3	Explore the concept of changing the independent variable in differential equations.
CO-4	Gain proficiency in applying PDEs to model and analyze various phenomena.
CO-5	Enhance problem-solving skills and analytical thinking through practical applications of mathematical methods.

UNIT – I

12 Hour

linear equations with Variable coefficients –separable Equations - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Bernoulli’s Equation-Exact differential equations.

UNIT – II

10 Hour

Equation of first order but not of higher degree: Equation solvable for dy/dx - Equation solvable for y -Equation solvable for x - Clairauts’ form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products.

UNIT – III

10 Hour

Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters.

UNIT – IV

10 Hour

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral-General integral-Lagrange’s Linear Equations –Simple Applications.

UNIT – V

10 Hour

Special methods – Standard forms-Charpit’s Methods – Simple Applications

Text Books

- Nayanayan.S and Manickavachagom pillay,T.K.(2006).”*Differential Equations and its Applications*”.Vishwanathan.S Printers and Publisher Pvt Ltd.,Chennai

Reference Books

- D.A. Murray, Introductory course in Differential Equations, Orient and Longman
- H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985.

- Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
- Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer- Verlag, New York. 1983.
- Tyn Myint-U and Lognath Debnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Define & Explain variable separable ordinary differential equations (ODEs).	K1&K2
CO 2	Solve particular integrals of algebraic, exponential, and trigonometric functions, as well as their products.	K3
CO 3	Analyze and interpret the results obtained using these methods.	K4
CO 4	Determine the problem-solving skills through hands-on applications of PDEs.	K5
CO 5	Develop problem-solving skills by applying learned methods to real-world applications.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	3	3	2	3
CO 2	3	2	2	2	3	3
CO 3	3	2	3	3	3	3
CO 4	2	3	3	3	3	2
CO 5	2	3	2	3	2	2

High Correlation – 60% Moderate Correlation – 40% Low Correlation - NIL

**STATISTICS WITH R PROGRAMMING
UMAR311**

Semester	: III	Credit	: 2
Category	: Skill Enhancement Course	Hours/Week	: 2
Class & Major	: II B.Sc Mathematics	Total Hour	: 26

Course Objectives

CO No.	To enable the students
CO-1	Understand and apply measures such as mean, median, and mode to summarize and describe the central tendency of a dataset.
CO-2	Learn techniques for measuring the spread or variability in a dataset using measures like range, variance, and standard deviation.

CO-3	Acquire skills in visually representing data through charts, graphs, and plots for effective communication and interpretation.
CO-4	Explore the concept of skewness and its importance in describing the asymmetry of a distribution.
CO-5	Develop proficiency in organizing and summarizing data using tables for systematic analysis.

List of Experiments:

1. Calculation of measures of central tendency
2. Calculation of measures of dispersion
3. Graphical display of data
4. Analyzing data using tables
5. Binomial, Normal and Poisson Distributions
6. Coefficient of variation
7. Measures of Skewness
8. Calculation of correlation coefficient
9. Rank Correlation
10. Finding Regression lines

References

- Mark Gardener, Beginning R – The statistical Programming Language, Wiley Publications, 2015
- W.John Braun and Duncan J. Murdoch, A First Course in Statistical Programming with R, Cambridge University Press, 2007.

Course Outcomes:

CO.No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall techniques for measuring the spread or variability in a dataset using measures like range, variance, and standard deviation and interpret measures of central tendency for given datasets.	K1&K2
CO 2	Apply regression analysis to model relationships between variables and make predictions.	K3
CO 3	Analyze measures of dispersion for various datasets.	K4
CO 4	Assess the strength and direction of relationships between variables using correlation coefficients.	K5

CO 5	Create and interpret graphical displays of data using appropriate visualization tools.	K6
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Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3

High Correlation – 90%

Moderate Correlation – 10%

Low Correlation – NIL

MATHEMATICS FOR DECISION MAKING

UMA301

Semester : III

Credit : 2

Category : SEC(Entrepreneurship)

Hours/Week : 1

Class & Major : II B. Sc Mathematics

Total Hour : 26

Course Objectives

CO No.	To enable the students
CO-1	Knowledge about the Set theory matrix and Decision Making problems
CO-2	Understand the compound interest and pure strategy techniques
CO-3	Apply the simple and compound in real life
CO-4	Analyze maximin and minimax criterion
CO-5	Evaluate the problems of two person zero sum games.

UNIT-I

5 Hours

Set and set operation – Venn diagrams- Elements of Co-ordinate systems – Slope intercept form of equation of the Straight Line.

UNIT-II

6 Hours

Matrices; Fundamental Ideas about Matrices and their Operational Rules – Matrix Multiplication – Inverse of Square Matrices of not more than 3 × 3 Order-Basic of Calculus-Rules of Differentiation – Integration and their Applications to Business.

UNIT-III

5 Hours

Simple and Compound Interest – Annuities – Sinking Funds – Discounts and Present Values.

UNIT-IV

5 Hours

Introduction – Decision Making Environment –Maximin or Minimax Criterion

UNIT-V

5 Hours

Pure Strategy (Saddle point) – Dominance Property – Mixed Strategies (2×2 Games,2×n Games

or $m \times 2$ Games, 3×3 Games) – Two-Person Zero Sum Games.

Text Books

- Gupta. P.K. Hira, D.S. *Operations Research*. S.Chand & Company Ltd. New Delhi.
- Kanthi Swarup, P. K. Gupta, Manmohan. (2006). *Operation Research*, S.Chand & Co. Pvt Ltd, New Delhi.

Reference Book

- Sundharesan. and Jayaseelan. (2003). *An Introduction to Business Mathematics*. S.Chand and Co Pvt. Ltd. New Delhi.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall the set operation and simple interest calculation	K1&K2
CO 2	Solve compound interest problem	K3
CO 3	Construct the concepts of Sinking Funds	K4
CO 4	Develop the two person problems in game theory	K5
CO 5	Evaluate the problems Dominance Property and Mixed Strategies	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	3	3	2	3
CO 2	3	2	2	2	3	3
CO 3	3	2	3	3	3	3
CO 4	2	3	3	3	3	2
CO 5	2	3	2	3	2	2

High Correlation – 60% Moderate Correlation – 40% Low Correlation - NIL

INDUSTRIAL STATISTICS UMAM408

Semester	: IV	Credit	: 4
Category	: Major Core VII	Hours/Week	: 5
Class & Major	: II B.Sc Mathematics	Total Hour	: 65

Course Objectives

CO No.	To enable the students
CO-1	Understand the concepts of population growth and change.
CO-2	Learn direct and indirect standardization of death rates.

CO-3	Apply estimation techniques to mean, variance, and proportions.
CO-4	Gain proficiency in conducting t-tests, chi-square tests, and F tests.
CO-5	Develop skills in constructing and interpreting a complete life table.

UNIT – I Population growth

13 Hour

Population growth and change - arithmetic, geometric and exponential growth rates - Population estimation and projection.

UNIT - II Measures of mortality

13 Hour

Measures of mortality - Crude and Specific rates- Infant mortality rate - direct and indirect standardization of death rates - Complete life table.

UNIT – III Estimation

13 Hour

Estimation - Point estimation - interval estimation - mean - variance - proportions - simple problems.

UNIT - IV Parametric Tests

13 Hour

Parametric Tests - Testing of significance of small and large sample tests - t-test, chi-square test - F test.

UNIT - V Non- Parametric tests

13 Hour

Non- Parametric tests - Sign test, Wilcoxon test, Mann-Whitney U Test. Median test, Run test, Kolmogorov - Smirnov One Sample test. Chi- Square Tests - Goodness of fit - Test of independence of attributes.

Text Books:

- Gupta,S.P (2014): Statistical Methods, Sultan Chand & Sons .
- Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of Applied Statistics, Sultan Chand & Sons.

Reference Books

- Rohatgi, V.K. (1984) *An introduction to probability theory and Mathematical Statistics*, Wiley Eastern.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Understand both direct and indirect standardization techniques for death rates and Explain the concepts of population growth and change, and differentiate between arithmetic, geometric, and exponential growth rates.	K1&K2
CO 2	Apply tests such as the sign test, Wilcoxon test, Mann-Whitney U Test, median test, run test, and Kolmogorov-Smirnov one-sample test.	K3
CO 3	Analyzing data using chi-square tests for goodness of fit and independence of attributes.	K4
CO 4	Estimating and projecting populations using various methods.	K5

CO 5	Construct and analyze complete life tables.	K6
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Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	3	3	3	3	3
CO 2	2	2	2	1	1	3
CO 3	3	3	2	2	2	2
CO 4	3	3	3	3	2	2
CO 5	2	3	3	3	1	3

High Correlation – 53% Moderate Correlation – 37% Low Correlation – 10%

ELEMENTS OF MATHEMATICAL ANALYSIS

UMAM410

Semester	: IV	Credit	:4
Category	: Major Core VIII/ DSC (VII)	Hours/Week	: 5
Class & Major	: II B.Sc Mathematics	Total Hour	: 65

Course Objectives

CO No.	To enable the students
CO-1	Understand the significance of countability in various mathematical contexts.
CO-2	Explore real-valued functions and their significance in mathematical modeling.
CO-3	Extend the concept of limits to functions on the real line.
CO-4	Apply various tests for absolute convergence.
CO-5	Introduce the concept of sets and elements, and their role in mathematical structures.

UNIT-I: Sets and Functions

13 Hour

Sets and elements- Operations on sets- functions- real valued functions- equivalence-count ability-real numbers- least upper bounds.

UNIT-II: Sequence

13 Hour

Definition of a sequence and subsequence-limit of a sequence – convergent sequences–divergent sequences- bounded sequences-monotone sequences

UNIT-III: Convergent Sequence

13 Hour

Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior-Cauchy sequences.

UNIT-IV: Series of Real Numbers:

13 Hour

Convergence and divergence – series with non –negative terms-alternating series-conditional

convergence and absolute convergence- tests for absolute convergence.

UNIT-V

13 Hour

Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a line-Function continuous on a metric space

Text Books

- Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, (1 January 2020).

Reference Book

- T. M. Apostol, Mathematical Analysis (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
- R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
- E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
- K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Define sequences and subsequences, understanding their importance in mathematical analysis	K1&K2
CO 2	Identify and analyze both types of convergence.	K3
CO 3	Analyze and work with continuous functions in metric spaces.	K4
CO 4	Determine limits and classify sequences as convergent or divergent.	K5
CO 5	Construct and interpret limit superior and limit inferior for sequences.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	2
CO 4	3	3	3	2	2	3
CO 5	3	3	3	3	3	2

High Correlation – 83% Moderate Correlation – 17% Low Correlation - Nil

INTERGRAL TRANSFORMS & Z TRANSFORMS
UMAA412

Semester : IV Credit : 3
 Category : Major Allied IV Hours/Week : 4
 Class & Major : II B.Sc Mathematics Total Hour : 52

Course Objectives

CO No.	To enable the students
CO 1	Understand the Fourier series.
CO 2	Describe the ideas of Laplace Transforms
CO 3	Use Fourier transforms for solving boundary value problems.
CO 4	Equip with the methods of finding Z transforms.
CO 5	Plan the methods of solving difference equations by using Z transforms.

UNIT- I FOURIER SERIES

10

Hour

Fourier Series – Dirichlet’s Conditions – Even and odd functions– Half-range Fourier Series.

UNIT - II LAPLACE TRANSFORMS

10 Hour

Laplace Transforms – Laplace Transforms Derivatives of Integrals – Periodic Functions - Inverse Laplace Transforms - Solving Differential Equations using Laplace Transforms.

UNIT- III FOURIER TRANSFORMS

10 Hour

Fourier Integral Theorem – Complex Fourier Transform – Inversion Theorem for Complex Fourier Transform – Properties of Fourier Transforms – Convolution Theorem – Parseval’s Identity

UNIT-IV Z-TRANSFORMS

10 Hour

Definition, Example and Properties of Z-transform – The Inverse Z-transform - Power Series Method.

UNIT-V SOLUTIONS OF DIFFERENCE EQUATIONS BY USING Z-TRANSFORM

12

Hour

Partial Fraction Method, The Inverse Integral Method – Volterra Difference equation of Convolution type, Volterra Systems – Explicit Criteria for Stability of Volterra equation – Volterra Systems

Text Books

- Kandasamy. P. & Thilagavathy. K. (2005). *Mathematics* Volume II, IV. S.ChandPublications.
- Saber N. Elaydi. (2005). *An Introduction to Difference Equations*. Springer. Verlag NewYork.

Reference Book

- Vittal. P.R. (2010). *Differential Equations, Fourier & Laplace Transforms*. Probability.Margham Publications. Chennai.

Course Outcomes

CO No.	On completion of this course, students will be able to	Cognitive Level
CO 1	Define the Fourier series.	K1&K2
CO 2	Describe the Laplace transform and its properties.	K3
CO 3	Apply the Fourier Transforms and its real life application.	K4
CO 4	Solve problem using Z Transform.	K5
CO 5	Predict the methods of solving difference equations by using Z transforms.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	2	3	2	1	3
CO 3	2	3	3	3	3	3
CO 4	3	3	1	3	3	3
CO 5	2	3	3	3	3	3

High Correlation – 77%

Moderate Correlation – 17%

Low Correlation – 6%

COMPUTING MATHEMATICS

UMAR401

Semester : IV

Credit : 2

Category : Skill Enhancement Course

Hours/Week : 2

Class & Major : II B.Sc Mathematics

Total Hour : 26

Course Objectives

CO No.	To enable the students
CO 1	Understand and apply matrix operations such as multiplication, inverse, determinant, and explore special matrices like random and magic matrices.
CO 2	Learn to visualize mathematical functions by plotting 2D and 3D graphs.
CO 3	Extend the understanding of solving ODEs to second-order equations.
CO 4	Introduce another numerical method for solving algebraic equations, specifically the Newton-Raphson method.
CO 5	Develop programming skills using OCTAVE to check whether a given string is a palindrome or not.

List of Programs

1. Matrix manipulations such as multiplication, inverse, determinant, random, magic etc.
2. Solving system of linear equations.
3. To Plotting 2D & 3D graphs
4. Solving quadratic equations.
5. Write an OCTAVE program to check the given string is palindrome or not.

6. To find the binomial coefficients nCr
7. Program to generating Fibonacci numbers.
8. Program to solving an algebraic equation using bisection method.
9. Program to solving an algebraic equation using Newton Raphson method.
10. Solving first order Ordinary Differential Equations
11. Solving second order Ordinary Differential Equations

Course Outcomes

CO No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall the principles of plotting 2D and 3D graphs and Explain the significance of visual representation in mathematical analysis.	K1&K2
CO 2	Apply programming skills to write a functional program for palindrome checking.	K3
CO 3	Analyze special cases and real-world problems involving quadratic equations.	K4
CO 4	Explain the principles and convergence criteria of the bisection method.	K5
CO 5	Create accurate and informative 2D and 3D plots using computational tools.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	1	2	3	3

High Correlation – 63% Moderate Correlation – 34% Low Correlation – 3%

ALLIED PROGRAMMES OFFERED TO OTHER DEPARTMENT

STATISTICAL METHODS AND THEIR APPLICATIONS-I

UMAA119

Semester :I

Category :Allied

Class &Major : I B.Sc AI & ML

Credit : 3

Hours/Week : 4

Total Hours :52

Course Objectives:

CO No.	To enable the students
CO-1	Recall the basic concepts of Mathematical Statistics.

CO-2	Explain the Statistical Characteristics, Discrete and Continuous Distributions and their properties.
CO-3	Solve the series of Complex numbers.
CO-4	Discover the Statistical applications.
CO-5	Compare to Mappings by Elementary Functions.

UNIT-I **10 Hours**

Nature and Scope of Statistical Methods and Their Limitations — Classifications, Tabulation and Diagrammatic Representation of various types of statistical data — Frequency Curves and Ogives — Graphical determination of percentiles quartiles and their properties — Merits and Demerits.

UNIT-II **11 Hours**

Measures of Location — Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean and their properties — Merits and Demerits.

UNIT-III **10 Hours**

Measures of Dispersion — Range, Mean Deviation, Quartile Deviation, Standard Deviation, Coefficient of Variation, Skewness their properties with Problems.

UNIT-IV **11 Hours**

Probability of an event — Finitely additive probability space addition and multiplication theorems — Independence of events — Conditional Probability — Bayes Theorem.

UNIT-V **10 Hours**

Concepts of Random Variable — Mathematical expectation — Moments of random variable (raw and central moments) — Chebychev's inequality - Simple Problems.

Text Books

- Gupta, S.C. & Kapoor, V.K. (2008). *Fundamentals of Mathematical Statistics*. Sultan & Sons. New Delhi.

Reference Books

- Hogg, R.V. & Craig, A.T. (1998). *Introduction to Mathematical Statistics*. Macmillan. New York.
- Mood, A.M. Graybill, F.A. & Boes, D.G. (1974). *Introduction to Theory of Statistics*. McGrawHill. New York.

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define and explain the concepts of the nature, scope, and limitations of statistical methods, including classifications, Tabulations, and diagrammatic representations of various data types.	K1 & K2
CO-2	Develop the probability concepts, including finite additive probability space, addition and multiplication theorems, and conditional probability, to analyze and solve probability Problems, including using Bayes' theorem.	K3
CO-3	Examine the measures of location such as arithmetic mean, Median, mode, geometric mean, and harmonic mean, along with understanding their properties and applicability.	K4
CO-4	Compare measures of dispersion, including range, mean deviation, quartile deviation, standard deviation, and coefficient of variation, and understand their significance in describing data variability.	K5
CO-5	Improve the concepts related to random variables, moments (raw and central), moment generating functions, and Chebyshev's Inequality.	K6

CO – PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	3	3	3	3	3
CO 2	2	2	2	1	1	3
CO 3	3	3	2	2	2	2
CO 4	3	3	3	3	2	2
CO 5	2	3	3	3	1	3

High Correlation: 53% Moderate Correlation: 37% Low Correlation: 10%

MATHEMATICS FOR COMPUTER SCIENCE – I

UMAA125

Semester : I

Credit : 3

Category : Allied

Hours/Week : 4

Class & Major : I B.Sc Cyber Security

Total Hours : 52

Course Objectives:

CO No.	To enable the students
CO-1	Recall the basic concepts of Set Theory and Relations
CO-2	Explain the and interpret Venn diagrams of Set relations and Operations

CO-3	Solve Binary Operators in automation.
CO-4	Discover the Composition of Functions
CO-5	Compare to types of Binary Operations

UNIT-I

10 Hours

Proposition- Logical operators- Conjunction- Disjunction- Negation- Conditional and Bi-Conditional Operators- Converse- Inverse- Contra Positive- Logically Equivalent- Tautology and Contradiction- Arguments and Validity of Arguments.

UNIT-II

10 Hours

Sets- Set Operations- Venn Diagram - Properties of Sets- Number of Elements in a Set Cartesian product.

UNIT-III

10 Hours

Equivalence Relation- Equivalence Class- Partially and Totally Ordered sets- Functions- Types of Functions- Composition of Functions.

UNIT-IV

12 Hours

Types of Binary Operations- Commutative- Associative- Distributive and Identity Boolean algebra- Simple Properties - Finite State Machine.

UNIT-V

10 Hours

Derivation-Differential Coefficient of a Sum (or Difference) – Product Rule-Quotient Rule Successive Differentiation- Partial Differentiation- Applications of Differentiation- Tangent and Normal- Angle between Two Curves- Maximum and Minimum Values[Second Derivatives Test].

Text Books

- Venkataraman, M.K, (2003). *Discrete Mathematics*. National Publishing Company. Chennai.
- Narayanan, S. & Manicavacham Pillay, T.K.(2003). *Differential Calculus, Volume I*. Viswanathan.S.(Publishers and Printers) Pvt.Ltd. Chennai.

Reference Books

- Balaji.G. (2006). *Discrete Mathematics*. G.Balaji Publishers. Chennai.
- Kandasamy, P. Thilagavathi, K. Gunavathi.K. (2003). *Engineering Mathematics-I*. S.Chand& Company Ltd. Chennai.

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define and explain the concepts of the Relations between Sets and their property	K1 & K2
CO-2	Develop the interpret Venn diagrams of Set relations and Operations.	K3

CO-3	Examine set theory to solve real life problems	K4
CO-4	Compare Distributive and Identity Boolean algebra	K5
CO-5	Improve the concepts Angle between Two Curves	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	1	2	3	3

High Correlation – 63% Moderate Correlation – 34% Low Correlation – 3%

**BUSINESS MATHEMATICS
UMAA112**

Semester : I
Category : Allied
Class & Major : I B.Com(IAT)

Credit : 3
Hours/Week : 4
Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Understand mathematical finance, simple and compound interests, Depreciation and Discounting
CO 2	Recognize matrices and test for consistency of equation using matrices
CO 3	Apply the knowledge of mathematics with emphasis on management applications.
CO 4	Analyse and demonstrate the mathematical Skills in application oriented tasks.
CO 5	Develop proficiency in the application to solve business mathematics problems.

UNIT-I OPTIMIZATION

10 Hrs

Basic Calculus – Rules for Differentiation – Maxima and Minima and their Applications to Business.

UNIT-II COMMERCIAL ARITHMETIC

12 Hrs

Commercial Arithmetic – Simple and Compound Interest – Annuities- Sinking Funds -Discount and Present Values of Perpetuity.

UNIT-III DETERMINISTIC BUSINESS MODELS

10 Hrs

Simple Marketing Models - A Simple Advertising Budget Model - A Simple Inventory Model.

UNIT-IV MATRICES

10 Hrs

Matrix Theory – Operations on Matrices– Inverse of a Square Matrix (not more than 3rd order).
Chap-8:Sec 8.1-8.5

UNIT-V INTEGRATION

10 Hrs

Solving simultaneous equations using matrix method- Integration and their applications to business.
Chap-8: Sec 8.6 ,Chap-6:Sec 6.11

Text Book

- Sundaresan.V, Jeyaseelan.S.D “An Introduction to Business Mathematics” S.Chand and Company Ltd 2003

Reference Book

- Aggarwal B.M, “Business Mathematics and Statistics Fundamentals”, Sultan Chand and Sons,2003.

Course Outcomes

CO No.	The student will be able to	PSOs Addressed	Cognitive Level
CO 1	Record and assess mathematical finance, simple and compound Interests, depreciation and discounting.	PSO 3	K1
CO 2	Calculate matrices and test the consistency of system of equations	PSO 5	K2
CO 3	Apply differentiation in real life problem.	PSO 1	K3
CO 4	Solve a variety of interest formulas and calculate payroll	PSO 2	K3
CO 5	Design concept in international business concepts	PSO 4	K4

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	1	2	3	3

High Correlation – 63% Moderate Correlation – 34% Low Correlation – 3%

**BUSINESS STATISTICS
UMAA301**

Semester : III
Category : Allied
Class & Major : II BBA

Credit : 3
Hours/week : 4
Total Hours : 52

Course Objectives

CO No.	To enable the students
CO-1	Understand the various method of data collection and its diagrammatic representation
CO-2	Describe the measure of dispersion, Skewness and moments
CO-3	Apply the concepts of correlation and regression and its properties

CO-4	Analyse the index number using passche's methods
CO-5	Evaluate the time series using measures on trend and measure of seasonal Variations.

UNIT- I STAGES OF STATISTICAL SURVEY AND AVERAGES 10 Hour

Introduction- Nature, Scope and limitations of Statistics in Business – Collection of Data - Classification and Tabulation of data - Diagrammatic and Graphical Representation of data - Measures of Central tendency – Mean, median, mode, Geometric mean, Harmonic mean, quartiles.

UNIT- II DISPERSION, SKEWNESS AND MOMENTS 12 Hour

Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation, Lorenz Curve - Skewness – Definition - Types of Skewness – Absolute and Relative Measure of Skewness - Karl Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness & Kelly's coefficient of Skewness.

UNIT- III CORRELATION AND REGRESSION ANALYSIS 10Hour

Correlation Analysis - Types of Correlation - Methods of Measuring Correlation - Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation coefficient – Regression Analysis - Regression Lines - Regression Equations.

UNIT- IV INDEX NUMBERS 10Hour

Index numbers – Unweighted index numbers – Simple Aggregate Method – Simple Average of Price Relatives Method- Weighted Index Numbers – Weighted Aggregate Method –Weighted Average of Price relatives method.

UNIT- V ANALYSIS OF TIME SERIES 10 Hour

Time series – Components of Time series – Trend, seasonal variation, cyclical variation , irregular variation – methods of measuring trend – graphical method, semi average method, moving average method, method of least squares.

Text Book

- Gupta S.P. (2006). *Statistical Methods*. S.Chand & Company Ltd. NewDelhi.

Reference Books

- Agarwal B.L. (2006). *Basic Statistics*. New Age International Publishers. (4th edn).
- Pillai R.S.N. (2010). *Statistics: Theory and Practice*. S.Chand & Company Ltd. NewDelhi.

- Elhance D.N and Veena Elhance and Agarwal B.M. (2018). *Fundamental of statistics. Kitab Mahal.*

Course Outcomes

CO No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Understand the various method of data collection and its diagrammatic representation	K1&K2
CO 2	Recognize the measure of dispersion, Skewness and moments	K3
CO 3	Apply the concepts of correlation and regression and its properties	K4
CO 4	Evaluate the index number using passche's methods	K5
CO 5	Discuss the time series using measures on trend and measure of seasonal Variations.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	1	2	3	3

High Correlation – 63% Moderate Correlation – 34% Low Correlation – 3%

STATISTICAL METHODS AND THEIR APPLICATIONS-II UMAA225

Semester : II
Category : Allied
Class & Major : I B.Sc AI & ML

Credits : 3
Hours/Week: 4
Total Hours : 52

Course Objectives:

CO No.	To enable the students
CO 1	Recall the basic concepts of Mathematical Statistics.
CO 2	Illustrate the Statistical Characteristics, Discrete and Continuous Distributions and their properties
CO3	Solve Sampling Theory Significance Tests and Testing of Hypothesis.
CO 4	Discover the Statistical applications.
CO 5	Deduct the knowledge of the usage of Correlation and Regression.

UNIT - I CORRELATION ANALYSIS**10 Hours**

Correlation Analysis-Significance or the Study of Correlation- Types of Correlation-Methods Studying Correlation-Scatter Diagram Method, Graphical Methods, Karl Pearson's co- Efficient of Correlation, Spearman's Rank Correlation Coefficient, Concurrent Deviation Method-Properties of Coefficient of Correlation.

UNIT - II REGRESSION ANALYSIS**10 Hours**

Regression Analysis-Uses of Regression Analysis-Regression Lines-Regression Equations-Properties of Regression Coefficient.

UNIT – III SAMPLING SURVEY AND DISTRIBUTION**11 Hours**

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling Distributions - Students 't'.

UNIT - IV TEST OF SIGNIFICANCE**10 Hours**

Test of significance - Large Sample Test for Proportion, Mean and Standard Deviation – Exact test based on 't', Chi - square and F- distribution with respect to Population Mean, Variance and Correlation Coefficient.

UNIT - V ANALYSIS OF VARIANCE**11 Hours**

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control design.

Text Book

- Gupta, S.C. & Kapoor, V.K. (2008). *Fundamentals of Mathematical Statistics*. Sultan & Sons. New Delhi.

Reference Books

- Hogg, R.V. & Craig, A.T. (1998). *Introduction to Mathematical Statistics*. Macmillan. New York.
- Mood, A.M. Graybill, F.A. & Boes, D.G. (1974). *Introduction to Theory of Statistics*. McGrawHill. New York.

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO 1	Recall and explain the different methods of correlation analysis, including scatter diagram method, graphical methods, and various correlation coefficients, to assess their appropriateness and Limitations in analyzing relationships between variables.	K1 & K2

CO 2	Build the regression analysis techniques to make predictions, understanding regression lines, equations, and coefficient properties, and showcasing the ability to model and interpret relationships Between variables.	K3
CO 3	Examine statistical population concepts, census, and sampling survey methods, understanding parameters vs. statistics, sampling distributions, and standard error, and interpreting the practical Implications of different distributions.	K4
CO 4	Assess significance testing methodologies, including large sample tests and chi-square tests, to determine the significance of population parameters, interpreting the results within the context of Real-world data.	K5
CO 5	Design experiments using principles such as randomization, replication, and control, and plan the analysis of variance for one- way and two-way classifications, demonstrating the ability to set up Effective experimental designs.	K6

CO – PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	2
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3

High Correlation: 90% Moderate Correlation: 10% Low Correlation: 0%

MATHEMATICS FOR COMPUTER SCIENCE-II

UMAA229

Semester : II

Credit : 3

Category : Allied

Hours/Week : 4

Class & Major : I B.SC Cyber Security

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO-1	Knowledge about the linear programming problem in industry
CO-2	Understand the techniques in transportation problem
CO-3	Apply the assignment problem
CO-4	Analyze game theory problem in business situations
CO-5	Create the network scheduling PERT.CPM

UNIT-I**10 Hours**

Binomial Series – Statement of Binomial Theorem for any Index – A Few Important Expansions – Application of the Binomial Theorem to the Summation of Series. Exponential Series – Summation of Series using Exponential Series – Logarithmic Series.

UNIT-II**10 Hours**

Higher Derivative – n^{th} Derivative – Formation of Equation Involving Derivative– Leibnitz Formula for the n^{th} Derivative of a Product (statement only). Radius of curvature (Cartesian Formula only) Jacobian.

UNIT-III**10 Hours**

Expansion of $\cos n\theta$ and $\sin n\theta$ - Powers of sines and cosines of θ in terms of Function of Multiple of θ - Expansion of $\cos^n\theta$ when n is the Positive Integer – Expansion of $\sin^n\theta$ when Positive Integer-Logarithm of Complex Number.

UNIT-IV**10 Hours**

Definite Integral – Properties of Definite Integrals – Integration by Parts using Bernouli’s formula – Double Integral.

UNIT-V**12 Hours**

Definition – Inverse Laplace transform – Solving Second Order Differential Equations using Laplace Transform.

Text Books

- Narayanan, S.Hanumantha Rao, R.Manicavachagom Pillay.(2008). *Ancillary Mathematics Volume –I*. S.Viswanathan (Printers & Publishers) Pvt.Ltd. Chennai.
- Narayanan, S.Hanumantha Rao, R.Manicavachagom Pillay. (2008).*Ancillary Mathematics Volume –II*.S.Viswanathan (Printers & Publishers) Pvt.Ltd. Chennai.

Reference Books

- Narayanan, S,Manickavachagom Pillay, T.K,(1996).*Algebra Volume I*. Vishwanathan.S. (Printers & Publishers) Pvt Ltd. Chennai.
- Narayanan, S.Manickavachagom Pillay, T.K. (1994).*Calculus Volume I*.Vishwanathan.S (Printers & Publishers).Pvt Ltd. Chennai.
- Narayanan, S. Manickavachagom Pillay, T.K. (1994). *Trigonometry*. (9thEd.). Vishwanathan. S. (Printers & Publishers) Pvt Ltd. Chennai.

- **Course Outcomes:**

-

CO. No.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Recall the linear programming problem in industry	K1&K2
CO 2	Solve the problem in various techniques in transportation problem	K3
CO 3	Formulate the assignment problem	K4
CO 4	Analyze game theory problems in business situations	K5
CO 5	Construct the network scheduling by PERT/CPM	K6

- **Course Mapping:**

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	3	3	2	3

CO 2	3	2	2	2	3	3
CO 3	3	2	3	3	3	3
CO 4	2	3	3	3	3	2
CO 5	2	3	2	3	2	2

- **High Correlation – 60%** **Moderate Correlation – 40%** **Low Correlation- NIL**

QUANTITATIVE TECHNIQUES FOR BUSINESS

UMAA410

Semester : IV

Category : Allied

Class & Major: II BBA

Credits : 3

Hours/Week : 4

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO-1	Knowledge about the linear programming problem in industry
CO-2	Understand the techniques in transportation problem
CO-3	Apply the assignment problem
CO-4	Analyze game theory problem in business situations
CO-5	Create the network scheduling PERT.CPM

UNIT-I LINEAR PROGRAMMING PROBLEM

10 Hour

Mathematical Formulation of the Problem- Graphical Solution Method- Some Exceptional Cases- General Linear Programming Problem- The Computational Procedure- Use of Artificial Variable Techniques.

UNIT-II TRANSPORTATION PROBLEM

12 Hour

General Transportation Problem-The Transportation Table-Loops in Transportation Tables- Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality-Degeneracy in Transportation Problem.

UNIT-III ASSIGNMENT PROBLEM

10

Hour

Mathematical

Formulation of the problem- the Assignment method- Special Cases in Assignment Problem. Simple problems.

UNIT-IV GAME THEORY

10 Hour

Two-person Zero-sum Games- Some Basic Terms- The Maximin - Minimax Principle- Games Without Saddle Points-Mixed Strategies- Graphic Solution of 2xn and mx2 Games.

UNIT-V NETWORK SCHEDULING BY PERT/CPM

10 Hour

Network and Basic Components- Logical Sequencing- Rules of Network Construction- Critical Path Analysis- Probability Considerations in PERT- Distinction between PERT and CPM. Simple problems.

Text Book:

- Kanti Swaroop. Gupta P.K. and Manmohan. (2003). *Operation Research*. Sultan Chand & Sons. Delhi.

Reference Books:

- Kapoor .V.K. (2018). *Introduction to Operation Research*. Sultan Chand & Sons. Delhi.
- Sharma S.D. (2012). *Operation Research*. Kedar Nath Ram Nath & Co.
- Taha.A Hamdy.(2000). *Operation Research - An Introduction*. (6th edn) Prentice Hall of India Pvt Ltd. New Delhi.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall the linear programming problem in industry	K1&K2
CO 2	Solve the problem in various techniques in transportation problem	K3
CO 3	Formulate the assignment problem	K4
CO 4	Analyze game theory problems in business situations	K5
CO 5	Construct the network scheduling by PERT/CPM	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	3	3	2	3
CO 2	3	2	2	2	3	3
CO 3	3	2	3	3	3	3
CO 4	2	3	3	3	3	2
CO 5	2	3	2	3	2	2

High Correlation – 60%

Moderate Correlation – 40%

Low Correlation- NI

BIO-STATISTICS
UMAA401

Semester : IV

Category : Allied

Class & Major : II B.Sc Bio - Chemistry

Credit : 3

Hours/week : 4

Total Hour : 52

Course Objectives

CO No.	To enable the students
CO 1	Define the basic concept & related to statistics.
CO 2	Discuss the measures of Central tendency.
CO 3	Solve the Measures of Dispersion in various fields.
CO 4	Distinguish Knowledge about correlation coefficients and regression.

CO 5	Interpret data via probability, conditional probability.
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UNIT-I STATISTICAL METHODS

10 Hours

Importance of Statistical Methods and their limitations – Collection, Classification and Tabulation of Statistical data – Diagrammatic and Graphical representation of statistical data.

UNIT – II MEASURES OF CENTRAL TENDENCY

10 Hours

Measures of Central tendency – Mean, Median, Mode, Geometric Mean, Harmonic mean.

UNIT – III DISPERSION, SKEWNESS AND MOMENTS

10 Hours

Measures of Dispersion – Range, Quartile deviation, Mean Deviation, Standard Deviation - Co-efficient of Variation – Lorenz curve - Skewness – Karl Pearson’s, Bowley’s and Kelly’s co-efficient of Skewness – Skewness and Kurtosis based on Moments.

UNIT – IV CORRELATION AND REGRESSION ANALYSIS

12 Hours

Correlation Analysis – Scatter Diagram – Karl Pearson’s Co-efficient of Correlation – Spearman’s Rank Correlation Coefficient – Co-efficient of Concurrent Deviation-Fitting of Straight line of the form $Y = ax + b$ by the method of least squares - Regression Analysis – Regression Lines – Regression Equations

UNIT – V PROBABILITY, RANDOM VARIABLES AND EXPECTATIONS

10 Hours

Concept of Probability – Addition and Multiplication theorem of probability – Baye’s Theorem - Concept of random variable - Distribution function – Definition of probability function for Discrete and Continuous Random Variable.

Text Book

- Pillai R.S.N. (2010). *Statistics: Theory and Practice*. S.Chand & Company Ltd. NewDelhi.

Reference Books

- Gupta S.P. (2011). *Statistical Methods*. S.Chand & Company Ltd. NewDelhi.
- Gupta.S.C. and Kapoor.V.K. (2008). *Elements of Mathematical Statistics*. S.Chand & Company Ltd. NewDelhi.
- Snedecor G.W and Cochran W.G. (2006). *Statistical Methods*. Oxford Press and IBH.

Course Outcomes

CO No.	On completion of the course ,the students will be able to	Bloom’s Level
CO 1	Summarize the fundamental concepts in statistical methods, measures of central tendency, dispersion, skewness, moments, correlation, regression analysis, probability, random variables,	K1, K2

	and expectations.	
CO 2	Apply statistical data methods to organize effectively.	K3
CO 3	Examine the relationships between variables using correlation and regression techniques.	K4
CO 4	Compare the appropriateness of statistical methods for different types of data.	K5
CO 5	Interpret the probability distributions and expectations for random variables.	K6

CO – PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	2
CO 2	3	3	3	2	3	2
CO 3	3	3	3	3	3	2
CO 4	2	3	3	3	3	2
CO 5	2	2	3	3	3	3

High Correlation : 66.67% Moderate Correlation : 33.33%
Low Correlation : 0%

DISCRETE MATHEMATICAL STRUCTURES

UMAA311

Semester : III Credit :3
Category : Allied Hours/Week : 4
Class & Major : II B.Sc Computer Science Total Hour : 52
Course Objectives

CO No.	To enable the students
CO-1	Understand the significance of countability in various mathematical contexts.
CO-2	Explore real-valued functions and their significance in mathematical modeling.
CO-3	Extend the concept of limits to functions on the real line.
CO-4	Apply various tests for absolute convergence.
CO-5	Introduce the concept of sets and elements, and their role in mathematical structures.

UNIT-I: MATHEMATICAL LOGIC

10 Hour

Introduction – Propositions – Connectives – Order of Precedence for Logical Connectives – Conditional and Biconditional Propositions – Tautology and Contradiction – Equivalence of Propositions.

UNIT-II: SET THEORY

10 Hour

Introduction – Basic Concepts and Notations – Ordered Pairs and Cartesian Product – Set Operations.

UNIT-III: NUMBER THEORY

11 Hour

Introduction – Divisibility – Prime Numbers – Fundamental Theorem of Arithmetic – Division Procedure – Greatest Common Division.

UNIT-IV: COMBINATORICS

11 Hour

Introduction – Permutation and Combinations – Pascal’s Identity – Vandermonde’s Identity – Pigeonhole Principle.

UNIT-V: RELATIONS

10 Hour

Relations – Types of Relations – Some Operations on Relations – Composition of Relations – Properties of Relations – Equivalence Classes.

Text Books

- Veerarajan T. (2007). Discrete Mathematics with Graph Theory and Combinatorics. Tata McGraw Hill Education Pvt. Ltd.

Reference Book

- Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, (1 January 2020).
- T. M. Apostol, Mathematical Analysis (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
- R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
- E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
- K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Recall and identify different types of propositions (simple, compound).	K1&K2
CO 2	Apply the concept of ordered pairs and Cartesian products in relations and functions.	K3
CO 3	Analyze the properties of prime numbers and their implications in number theory.	K4
CO 4	Evaluate the efficiency of different combinatorial methods for solving problems.	K5
CO 5	Create new examples of relations with specific properties (reflexive, symmetric, transitive).	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	2
CO 4	3	3	3	2	2	3
CO 5	3	3	3	3	3	2

High Correlation – 83% Moderate Correlation – 17% Low Correlation - Nil

DISCRETE MATHEMATICAL STRUCTURES

UMAA311

Semester : IV Credit :3
Category : Allied Hours/Week : 4
Class & Major : II B.Com/B.Com (CA) Total Hour : 52

Course Objectives:

CO No.	To enable the students
CO-1	Understand impart knowledge on the basics of ratio, proportion, indices and proportions
CO-2	Gain and learn about simple and compound interest and arithmetic, geometric and harmonic progressions.
CO-3	Apply familiarize with the measures of central tendency
CO-4	Discuss the concept ualise with correlation co-efficient
CO-5	Gain knowledge on time series analysis

UNIT-I: RATIO 10 Hour

Ratio, Proportion and Variations, Indices and Logarithms.

UNIT-II: INTEREST AND ANNUITY 10 Hour

Banker’s Discount – Simple and Compound Interest - Arithmetic, Geometric and Harmonic Progressions.

Annuity - Meaning - Types of Annuity Applications.

UNIT-III: BUSINESS STATISTICS MEASURES OF CENTRAL TENDENCY 11 Hour

Arithmetic Mean, Geometric Mean - Harmonic Mean - Mode and Median – Quartiles – Deciles - Percentiles. Measures of Variation – Range - Quartile Deviation and Mean Deviation - Variance and Standard Deviation & Co-efficient.

UNIT-IV: CORRELATION AND REGRESSION 11 Hour

Correlation - Karl Pearson’s Coefficient of Correlation – Spearman’s Rank Correlation – Regression Lines and Coefficients

UNIT-V: TIME SERIES ANALYSIS AND INDEX NUMBERS 10 Hour

Relations – Types of Relations – Some Operations on Relations – Composition of Relations –

Properties of Relations – Equivalence Classes.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall and identify the basics of ratio, proportion, indices and logarithm	K1&K2
CO 2	Apply the concept calculations of simple and compound interest and arithmetic, geometric and harmonic progressions.	K3
CO 3	Determine the various measures of central tendency	K4
CO 4	Evaluate the correlation and regression co-efficient.	K5
CO 5	Create Assess problems on time series analysis	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	2
CO 4	3	3	3	2	2	3
CO 5	3	3	3	3	3	2

High Correlation – 83% Moderate Correlation – 17% Low Correlation - Nil

III and IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component III	Component IV
III	Major Core V	UMAM310	Vector Calculus and Application	Assignment	Term Paper
III	Major Core VI	UMAM312	Differential Equation and application	Assignment	Seminar
III	Skill Enhancement course (Entrepreneurship)	UMAD301	Mathematics for Decision Making	Assignment	Term Paper
IV	Major Core VII	UMAM408	Industrial Statistics	Assignment	Seminar
IV	Major Core VIII	UMAM410	Elements of Mathematical Analysis	Assignment	Term Paper
IV	Major Allied IV	UMAA412	Integral Transforms & Z Transforms	Assignment	Problem Solving

III AND IV EVALUATION COMPONENTS OF CIA-ALLIED

Semester	Category	Course code	Course Title	Component III	Component IV
III	Allied	UMAA301	Business Statistics	Assignment	Seminar
IV		UMAA410	Quantitative Techniques for Business	Assignment	Problem Solving
I	Allied	UMAA119	Statistical Methods and their Applications I	Problem solving	Assignment
II	Allied	UMAA225	Statistical Methods and their Applications II	Assignment	Problem solving
I	Allied	UMAA125	Mathematics For Computer Science – I	Assignment	Problem solving
II	Allied	UMAA229	Mathematics For Computer Science - II	Assignment	Problem solving
IV	Allied	UMAA401	Bio Statistics	Problem solving	Assignment
III	Allied	UMAA112	Business Mathematics	Problem solving	Assignment
IV	Allied	UMAA412	Business Mathematics & Statistics	Problem solving	Assignment
III	Allied	UMAA311	Discrete Mathematics	Problem solving	Assignment

**PG & RESEARCH DEPARTMENT OF MATHEMATICS
PROGRAMME SPECIFIC OUTCOMES**

PSO No.	Upon completion of the M.Sc. Mathematics Programme, the students will be able to
PSO-1	Gain knowledge an advanced models and methods of Mathematics.
PSO-2	Understand the societal and ethical responsibilities of the professionals in their respective discipline.
PSO-3	Inculcate the habit of self-learning throughout life, through self- paced and self- directed learning aimed at personal development.
PSO-4	Create awareness to become an enlightened citizen with commitment to deliver one’s responsibilities within the scope of bestowed rights and privileges
PSO-5	Deduct deep and advanced learning on topics in pure and applied mathematics, empowering the students to do research.
PSO-6	Create the proficiency for the preparation of National level Competitive Examination

PROGRAMME PROFILE M.Sc. (MATHEMATICS)

Sem	Part	Category	Course Code	Course Title	Contact Hours/ Week	Credit
						Min/Max
I	I	Major Core I	PMAM111	Algebraic structures	5	4
		Major Core II	PMAM112	Real Analysis I	5	4
		Major Core III	PMAM113	Ordinary Differential Equations	5	4
	II	Elective I (DSE)	PMAM114	Graph Theory and Applications	5	3
		Elective II (DSE)	PMAM115	Fuzzy Sets and their Applications	5	3
	III	SEC I (NME)	-	-	3	2
	IV	Online Course	PONL101	-	2	2
				TOTAL	30	22
II	I	Major Core IV	PMAM212	Advanced Algebra	5	4
		Major Core V	PMAM213	Real Analysis II	5	4
		Major Core VI	PMAM214	Partial Differential Equations	5	4
	II	Elective III (DSE)	PMAM215	Mathematical Statistics	4	3
		Elective IV (DSE)	PMAM216	Artificial Intelligence and Machine Learning	4	3
	III	Core Industrial Moadule	PMAM217	Mathematical Finance and Financial Management	4	3
	IV	SEC II (Discipline	PMAR201	Research Tools and Techniques	3	2

		Specific)				
	V	Internship	PINS201	-	30 hours/60 hours	2
		Service Learning	PMAX201/ PMAX202	Mathematics for High School Students/Elementary Mathematics for Higher Secondary Students	(8 Days)	1
				TOTAL	30	26
III	I	Major Core VII	PMAM315	Complex Analysis	5	4
		Major Core VIII	PMAM316	Probability Theory	5	4
		Major Core IX	PMAM317	Topology	5	4
	III	Core Industrial Module	PMAM320	Industrial Statistics & Stochastic Process	4	3
	II	Elective V(DSE)	PMAM318	Algebraic Number Theory	3	3
		Elective VI(DSE)	PMAM319	Industrial Operations Research	4	3
	IV	SEC III -Inter Disciplinary	PMAI301	Research Methodology: methods and techniques	4	2
				TOTAL	30	23
IV	I	Major Core X	PMAM411	Functional Analysis	5	4
		Major Core XI	PMAM412	Differential Geometry	5	4
		Major Core XII	PMAM413	Mechanics	5	4
		Major Core XIII	PMAM402	Project with viva voce	6	4
	II	Elective VII(DSE)	PMAM414	Resource Management Techniques	5	3
	III	Professional Competency Skills(SEC)	PMAC401	Problem Solving in Advanced Mathematics	4	2
	IV	Internship	-	-	-	-/2
				TOTAL	30	21/23
				GRAND TOTAL	120	92/94

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course c ode	Course Title	Hours/week	Credit
					Min/Max
III	Self-Study Paper	PMAS301	Difference Equation	2	-/1
		PMAS302	Combinatorial Analysis	2	-/1

COMPLEX ANALYSIS
PMAM315

Semester : III
Category : Major Core VII
Class & Major: II M. Sc. Mathematics

Credit : 4
Hours/Week : 5
Total Hours : 65

Course Objectives:

CO. No.	To enable the students
CO-1	Understand the basics of complex line integral and Cauchy theorem.
CO-2	Recognize the Definite integrals and Schwarz theorem.
CO-3	Apply the Arzela's theorem
CO-4	Analyse the Riemann Mapping Theorem.
CO-5	Create the fascinating world of elliptic functions which is markedly different from analyzing real variable

UNIT-I THE GENERAL FORM OF CAUCHY THEOREM

13 Hour

Chains and cycles – Simple continuity – Homology – The General statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Local exact differential – Multiply connected regions – Residue Theorem – The Argument Principle.

UNIT-II EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS

13 Hour

Evaluation of Definite Integrals – Schwarz Theorem – Weierstras-p s Theorem – Taylor's Series – Laurent Series.

UNIT-III PARTIAL FRACTION AND ENTIRE FUNCTIONS

13 Hour

Gamma Function - Equicontinuity -Normality and compactness - Arzela's theorem- Families of analytic function-The Classical definition.

UNIT-IV RIEMANN MAPPING THEOREM

13 Hour

Statement and Proof - Behavior at an angle - Schwarz - Christoffel formula – Mapping on a rectangle - Functions with mean value property – Harnacks principle.

UNIT-V ELLIPTIC FUNCTIONS

13 Hour

Simply Periodic Functions - Doubly Periodic Functions.

Text Book

- Lars V. Ahlfors. (1979). *Complex Analysis*. [3rd Edn]. McGraw Hill. New York.

Reference Books

- Conway J.B. (1978). *Functions of one complex variables*. Springer – Verlag, International student Edition, Narosa Publishing Co.
- Hille E. (1959). *Analytic Function Theory* [2 vols]. Gonm & Co.
- Heins M. (1968). *Complex Function Theory*. New York, Acamedic Press.
- Presfly H.A. (1990). *Introduction to Complex Analysis*. Clarendon Press, Oxford.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall the Index of a point with respect to a closed curve and understand the the concept of Simple Continuity in the study of analytical functions.	K1 & K2
CO 2	Utilize methods for the Evaluation of definite integrals over complex domains	K3
CO 3	Examine Harnack's Principle in the context of complex analysis.	K4
CO 4	Develop Insight into periodic functions	K5
CO 5	Create the Problem Solving using reflection principle	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	2	1
CO 2	3	3	3	2	2	1
CO 3	3	3	3	3	3	2
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	3	3

High Correlation: 73.33% Moderate Correlation: 16.67% Low Correlation: 6.67%

PROBABILITY THEORY

PMAM316

Semester : III

Category : Major Core VIII

Class & Major : II M.Sc Mathematics

Credit : 4

Hours/Week : 5

Total Hours : 65

Course Objectives:

CO. No.	To enable the students
CO-1	Recall the concepts of Probability.
CO-2	Recognise the Conditional probability and expectation.
CO-3	Calculate discrete probability distributions by applying probability laws and theoretical results.
CO-4	Calculate and interpret joint distribution function.
CO-5	Evaluate moment generating Functions and weak law of large numbers..

UNIT-I RANDOM EVENTS AND RANDOM VARIABLES**13 Hours**

Random events – Probability axioms – Combinatorial formulae – conditional probability – Bayes Theorem – Independent events – Random Variables – Distribution Function – Joint Distribution – Marginal Distribution – Conditional Distribution – Independent random variables – Functions of random variables.

UNIT-II PARAMETERS OF THE DISTRIBUTION**13 Hours**

Expectation- Moments – The Chebyshev Inequality – Absolute moments – Order parameters – Moments of random vectors – Regression of the first and second types

UNIT-III CHARACTERISTIC FUNCTIONS**13 Hours**

Properties of characteristic functions – Characteristic functions and moments – semi invariants – characteristic function of the sum of the independent random variables – Determination of distribution function by the Characteristic function – Characteristic function of multidimensional random vectors – Probability generating functions.

UNIT-IV SOME PROBABILITY DISTRIBUTION**13 Hours**

One point , two point , Binomial – Polya – Hypergeometric – Poisson (discrete) distributions – Uniform – normal gamma – Beta – Cauchy and Laplace (continuous) distributions.

UNIT-V LIMIT THEOREMS**13 Hours**

Stochastic convergence – Bernaulli law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer Theorems – de Moivre-Laplace Theorem – Poisson, Chebyshev, Khintchine Weak law of large numbers – Lindberg Theorem – Lapunov Theroem – Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers.

Text Book

- M. Fisz, *Probability Theory and Mathematical Statistics*, John Wiley and Sons, New York, 1963.

Reference Book

- R.B. Ash, *Real Analysis and Probability*, Academic Press, New York, 1972
- K.L.Chung, *A course in Probability*, Academic Press, New York, 1974.
- R.Durrett, *Probability : Theory and Examples*, (2nd Edition) Duxbury Press, New York, 1996.
- V.K.Rohatgi *An Introduction to Probability Theory and Mathematical Statistics*, Wiley Eastern Ltd., New Delhi, 1988(3rd Print).

Course Outcomes:

CO. NO	On completion of this course, students will be able to	Bloom's Level
CO 1	Discuss the formulation of modern Probability Theory and Interpret conditional probability models and function of random variables based on single & multiples random variables.	K1&K2
CO 2	Apply the probability axioms and combinatorial formulae to calculate probabilities.	K3
CO 3	Analyze conditional probability and apply Bayes' Theorem in real-world scenarios.	K4
CO 4	Develop the specific applications to moments generating functions	K5
CO 5	Evaluate various weak laws of large numbers, Borel-Cantelli Lemma, and Kolmogorov Inequality.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2

CO 2	3	3	3	3	2	2
CO 3	2	3	3	3	3	2
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	3	3

High Correlation: 70%

Moderate Correlation: 30%

Low Correlation: 0%

TOPOLOGY

PMAM317

Semester : III

Category : Major Core IX

Class & Major: II M.Sc Mathematics

Credit : 4

Hours/Week : 5

Total Hours : 65

Course Objectives:

CO. NO	To enable the students
CO-1	Recall Metric space, Open set, Closed set theorems, completeness and Continuous Function
CO-2	Recognize the concept of continuous mappings between topological spaces.
CO-3	Explain the Urysohn metrization theorem and Tychonoff theorem
CO-4	Find the basics of connectedness and compactness of a topological space.
CO-5	Construct the Weierstrass Approximation Theorem.

UNIT-I METRIC SPACES

13 Hour

Partially Ordered Set and Lattices – Metric Spaces – Definitions and Examples – Open Sets– Closed sets – Convergence, Completeness and Baire's theorem – Continuous Mappings – Spaces of Continuous Function – Euclidean and Unitary Spaces.

UNIT-II TOPOLOGICAL SPACES

13 Hours

Definitions and Examples – Elementary Concepts – Open base and Open Sub base – Weak Topologies – The Function Algebras

UNIT – III COMPACTNESS

13 Hour

– Compactness – Compact Spaces – Product Spaces – Tychonoff's Theorem and Locally Compact Spaces – Compactness for Metric Spaces – Ascolis Theorem.

UNIT-IV SEPARATION

13 Hour

T_1 spaces Hausdroff's spaces – Completely Regular Spaces and Normal Spaces – Urysohn's Lemma and Tietze Extension Theorem – The Urysohn's Embedding Theorem – The Stone-Cech Compactification.

UNIT-V CONNECTEDNESS

13 Hour

Connected Spaces – The Components of a Space – Totally Disconnected Spaces – Locally Connected Spaces.

Text Book

- George F. Simmons. (1999). *Introduction to Topology and Modern Analysis*.

McGraw Hill, New Delhi.

Reference Books

- Dugunji.J., (1975). *Topology*. Prentice Hall of India, New Delhi.
- Munkers R James. (2002). *A first course in Topology*. Pearson Education. Pvt.Ltd. New Delhi.

Course Outcomes:

CONo.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recognize terms, definitions and theorems related to metric spaces.	K1 &K2
CO 2	Demonstrate concepts such as open and closed sets, interior, closure and boundary.	K3
CO 3	Examine Urysohn's Lemma and Tietze Extension Theorem.	K4
CO 4	Evaluate the significance of separation axioms in topology	K5
CO 5	Develop new topological spaces by using Weierstrass Theorem.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	3	3	2	2
CO 3	2	3	3	3	1	2
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	3	1

High Correlation: 63.33%

Moderate Correlation: 30.00%

Low Correlation: 6.67%

INDUSTRIAL STATISTICS & STOCHASTIC PROCESS PMAM320

Semester : III

Category : Core Industry Module

Class &Major: II M.Sc Mathematics

Credit : 3

Hours/Week : 4

Total Hours : 52

Course Objectives:

CO. No	To enable the students
CO-1	Understand the foundational concepts of probability theory.
CO-2	Explore the relationship between causality and randomness.
CO-3	Apply set theory concepts to solve basic probability problems.
CO-4	Solve conditional probability problems.
CO-5	Analyze and solve problems related to higher transition probabilities.

UNIT – I PROBABILITY AND RANDOM VARIABLES

10 Hours

Introduction – definition-probability and induction- causality versus Randomness- set theory

UNIT – II AXIOMS OF PROBABILITY

10 Hour

Probability Space – Conditional Probability – Conditional Probability Problems

UNIT – III INTRODUCTION TO MARKOV CHAINS

10 Hour

Introduction – Higher Transition Probabilities and the Chapman – Kolmogorov Equation – Classification of states

UNIT – IV STATIONARY AND LIMITING DISTRIBUTIONS **12 Hour**

Stationary Distribution and limiting – Probabilities Transient states and absorption probabilities

UNIT – V MARKOV CHAINS **12 Hour**

Branching Process – Mixed type population of constant size – Structure of periodic chains

Text Book

- Papoulis A “*Probability, Random Variable and Stochastic Process*” McGraw Hill Higher Education, 4th edition.

Reference Books

- Baisnab A., Jas M., Elements of Probability and Statistics, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 1993
- Freund John E, Mathematical Statistics, Prentice Hall of India, New Delhi

Course Outcomes:

CO.NO	On completion of this course, students will be able to	Bloom’s Level
CO 1	Define and explain the fundamental concepts of probability & Understand and differentiate between probability and induction.	K1 & K2
CO 2	Apply set theory concepts to solve basic probability problems.	K3
CO 3	Analyze higher transition probabilities and apply the Chapman–Kolmogorov equation.	K4
CO 4	Determine absorption probabilities in continuous Markov Chains.	K5
CO 5	Solve various aspect of probability problems	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	2
CO 2	3	3	2	3	2	2
CO 3	2	3	3	3	3	2
CO 4	3	2	3	1	3	2
CO 5	3	3	3	3	1	3

High Correlation: 56.66% **Moderate Correlation: 36.66%** **Low Correlation: 6.67%**

ALGEBRAIC NUMBER THEORY

PMAM318

Semester : III

Category : Major Elective V

Class & Major: II M.Sc Mathematics

Credit : 3

Hours/Week : 3

Total Hours : 39

Course Objectives:

CO.NO	To enable the students
CO-1	Define elementary properties of congruence.
CO-2	Congruence in real-world scenarios.
CO-3	Analyze the techniques for solving systems of simultaneous congruence.
CO-4	Analyze quadratic residues for composite modules using Jacobi's Symbol.
CO-5	Develop the techniques to problems of Quadratic Residue for Composite Modules

UNIT I - CONGRUENCES

8 Hours

Definition and basic properties of congruences – Residue class and Complete Residue System – Linear Congruences- Reduced residue systems and the Euler – Fermat Theorem

UNIT II FINITE ABELIAN GROUP

8 Hours

Definitions – examples of groups and subgroups – elementary properties of groups and constructions of subgroups –Characters of finite abelian group.

UNIT III PRIMITIVE ROOTS

8 Hours

Exponent of a number mod primitive roots – Primitive roots and reduced residue systems – the non-existence of primitive roots –The existence of primitive roots mod p for odd prime's p.

UNIT IV QUADRATIC RESIDUES

7 Hours

Quadratic Residues - Legendre's Symbol and its properties-Evaluation of $(-1/p)$ and $(2/p)$ - Gauss Lemma

UNIT V JACOBI'S SYMBOL

8 Hours

The quadratic reciprocity law- Application Reciprocity Law - Jacobi's Symbol

Text Book

- Tom M.Apostol “ *Introduction to analytic number theory*” Springer international student edition

References

- S.B.Malik, Basic Number Theory, Second Edition, Vikas Publishing House Pvt. Ltd., Noida, 2009.
- George E. Andrews, Number Theory, Courier Dover Publications, 1994.

Course Outcomes:

CO. No	On completion of this course, students will be able to	Bloom's Level
CO 1	Define and understand elementary properties of congruence.	K1 &K2
CO 2	Solve problems related to congruence in real-world scenarios.	K3
CO 3	Analyze the techniques for solving systems of simultaneous congruence.	K4
CO 4	Analyze quadratic residues for composite modules using Jacobi's Symbol.	K5

CO 5	Develop the techniques to problems of Quadratic Residue for Composite Modules	K6
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Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	1
CO 2	3	3	3	2	3	2
CO 3	3	3	3	3	3	2
CO 4	2	3	3	3	3	2
CO 5	2	2	3	3	3	3

High Correlation : 63.33% Moderate Correlation: 33.33% Low Correlation: 3.33%

**INDUSTRIAL OPERATION RESEARCH
PMAM318**

Semester : III

Category : Major Elective VI

Class &Major: II M.Sc Mathematics

Credit : 3

Hours/Week : 4

Total Hours : 52

Course Objectives:

CO. NO	To enable the students
CO-1	Understand the fundamental concepts of network scheduling in PERT/CPM.
CO-2	Apply economic order quantity (EOQ) models for inventory management.
CO-3	Explore non-Markovian queuing systems and their probabilistic models.
CO-4	Identify and discuss the characteristics of queuing systems.
CO-5	Construct project networks and identify critical paths.

UNIT I - THE LINEAR PROGRAMMING PROBLEM

13 Hours

The Linear Programming Problem – The Simplex Method – Artificial Variable Techniques – Dual Simplex method – Revised Simplex Method.(Simple Problems Only)

UNIT II - THE TRANSPORTATION PROBLEM

13 Hours

The Transportation Problem – Matrix Form – The Transportation Table – The Initial Basic Feasible Solution – Degeneracy in Transportation Problems – Optimum Solution – The Assignment and Routing Problems.

UNIT III - QUEUING THEORY

13 Hours

Queuing Theory – Queuing System – Characteristics of Queuing System – Poisson Process and Exponential Distribution – Classification of Queues – Transient and Steady States – Poisson Queues – Non – Poisson Queuing Systems – Non – Markovian Queues – Probabilistic models.

UNIT IV - INVENTORY CONTROL

13 Hours

Inventory Control – ABC Analysis – Economic Lot Size Problems – EOQ with Shortage – Multi-Item Deterministic Problem – Uncertain Demand – Inventory Control with Price Breaks. Replacement Problem – Replacement of Items that deteriorate with time

UNIT V - NETWORK SCHEDULING BY PERT/CPM

13 Hours

Network Scheduling by PERT/CPM – Basic Concepts – Constraints in Network – Construction of the Network – Time Calculations in Networks – Critical Path Method (CPM) – PERT – PERT Calculations.

Text Book:

- Kanti Swarup, P.K. Gupta and Man Mohan, “Operations Research”, Sultan Chand and Sons, 1992.

Reference Books:

- Hamdy A Taha, “Operations Research – An Introduction”, Macmillan Publishing Company, 1982.
- Don.T. Phillips, A.Ravindran, James.J.Solberg, “Operations Research – Principles and Practice”, John Wiley & Sons, 1976.

Course Outcomes:

CONo.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Define the key components and constraints of the linear programming problem and Explain the steps involved in the Simplex Method for solving linear programming problems.	K1 &K2
CO 2	Apply Poisson processes and exponential distribution to model and analyze queues.	K3
CO 3	Analyze the characteristics of the transportation table and its application in finding the initial basic feasible solution.	K4
CO 4	Determine the optimum solution for assignment and routing problems within the context of transportation problems.	K5
CO 5	Develop skills in constructing and analyzing networks for project scheduling using PERT/CPM.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	1
CO 2	3	3	3	2	3	1
CO 3	3	3	3	3	3	2
CO 4	2	3	3	3	3	2
CO 5	2	2	3	3	3	3

High Correlation: 63.33%

Moderate Correlation: 30%

Low Correlation: 6.67%

**RESEARCH METHODOLOGY: METHODS & TECHNIQUES
PMAI301**

Semester : III

Credit : 2

Category : Skill Enhancement Course SEC 3 - Interdisciplinary

Hour/Week : 4

Class & Major : II M.SC Mathematics

Total Hour :52

Course Objectives:

CO No.	To enable the students
CO -1	Understand the concepts of Research and its types
CO -2	Discuss Problem formulation, analysis and solutions
CO -3	Analyze data collection tools and packages.
CO -4	Technical paper writing / presentation without violating professional ethics
CO -5	Inculcate techniques for research and uses of tools

UNIT- I INTRODUCTION TO RESEARCH METHODOLOGY

10 Hour

Meaning of research – Objective of Research – Motivation in Research – Types of Research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Methods – Importance of Knowing How Research is Done – Research Process – Criteria for Good Research.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN

10 Hour

Research Problem – Selecting Research Problem – Necessity of Defining A Problem – Techniques of Defining Problem – Formulation of Research Problem, Objectives of Research Problem. Meaning of Research Design – Need for Research Design – Important Concept Related to Research Design – Different Research Designs – Basic Principles of Experimental Design; Important Experimental Design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS

10 Hour

Census And Sample Surveys – Characteristics of Good Sample Design – Different Types of Sample Designs – Techniques of Selecting a Random Sample-Accepts of Method Validation – Observation and Collection of Data – Methods of Data Collection – Sampling Methods – Data Processing and Analysis Strategies and Tools – Data Analysis with Statically Package (Sigma STAT,SPSS For Student T-Test, ANOVA, Etc.), Hypothesis Testing

UNIT-IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR

11 Hour

Interpretation and report writing; Meaning of interpretation; techniques of interpretation; precautions in interpretation; significance of report writing, layout of research report, types of reports; Presentation of research work-oral, poster and writing research paper; Precautions for writing research report, conclusion. Ethics-ethical issues, related to research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the patent system – Basic, principles and general requirements of patent law.

UNIT-V TOOLS FOR ANALYSIS

11 Hour

Interpretation of data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

Text Books

- Kothari, C. R. (2021). “*Research Methodology: Research and techniques*”, New Delhi:New Age International Publishers.
- Carlos, C.M. (2000), “*Intellectual property rights. The WTO and developing countries: the TRIPS agreement and policy options*”, Zed Books. New York.
- Beier F.K, Crespi R.S and Straus T, “*Biotechnology and Patent protection*” Oxfordand IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery, “*SPSS for Windows*”, Pearson Education.

Reference Books

- Singh, Y. K. (2006), “*Fundamental of Research Methodology and Statistics*” New Delhi. New International (P) Limited. Publishers.
- Wallinman,N. (2006)., “*Your Research Project: A step-by-step guide for the first-time researcher*”. London: Sage Publications.
- Wilkison , T.S. & Bhandarkar . P.L., (2000), “*Methodology and Techniques of Social Research*”. Mumbai. Himalaya Publishing House.
- Leslie Lamport, “*LaTeX: A Document Preparation System*”, Second Edition.

E-Resources

- [http:// www.ptt.ed/-super7/430114401/4391.ptt/](http://www.ptt.ed/-super7/430114401/4391.ptt/).
- <https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf>
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom’s Level
CO-1	Understand research and its goals, Critical thinking, Techniques for generating research topics	K1
CO-2	Apply different research design to create research Module.	K2

CO-3	Analyze different methods of data collection for the development of research studies	K3,K4
CO-4	Determine the interpretation and report writing.	K5

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	1
CO 2	3	3	3	2	3	2
CO 3	3	3	3	3	3	2
CO 4	2	3	3	3	3	2
CO 5	2	2	3	3	3	3

High Correlation : 63.33%

Moderate Correlation: 33.33%

Low Correlation : 3.33%

**FUNCTIONAL ANALYSIS
PMAM411**

Semester : IV

Category : Core X

Class & Major: II M. Sc. Mathematics

Credit : 4

Hours/Week : 5

Total Hours : 65

Course Objectives:

CO.NO	To enable the students
CO-1	Recall the topological-algebraical structures and properties of Banach spaces.
CO-2	Recognize the Banach spaces, the spectral theorem and some of its applications.
CO-3	Apply the Hilbert Space in Normal and Unitary Operators.
CO-4	Find the fixed point theorem and spectral theorem of Banach algebras.
CO-5	Evaluate the structure of commutative Banach algebras.

UNIT-I BANACH SPACES

13 Hours

The definition and some examples – Continuous linear transformations – The Hahn-Banach theorem – The natural imbedding of N in N^{**} - The open mapping theorem – The conjugate of an Operator.

UNIT-II HILBERT SPACES

13 Hours

The definition and some simple properties–Orthogonal complements–Ortho normal sets–The conjugate space H^* –The adjoint of an operator–self-adjoint operators–Normal and unitary operators – Projections.

UNIT-III FINITE-DIMENSIONAL SPECTRAL THEORY

13 Hours

Matrices – Determinants and the spectrum of an operator –The spectral theorem.

UNIT-IV GENERAL PRELIMINARIES ON BANACH ALGEBRAS

13 Hours

The definition and some examples – Regular and singular elements – Topological divisors of

zero – The spectrum – The formula for the spectral radius– The radical and semi-simplicity.

UNIT-V THE STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS 13 Hours

The Gelfand mapping – Application of the formula $r(x) = \lim \|x^n\|^{1/n}$ – Involutions in Banach algebras-The Gelfand- Neumark theorem.

Text Book

- G.F.Simmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Education (India) Private Limited, New Delhi, 1963

Reference Books

- W.Rudin, *Functional Analysis*, McGraw Hill Education (India) Private Limited, New Delhi, 1973.
- B.V. Limaye, *Functional Analysis*, New Age International, 1996.

Course Outcomes:

CO. No.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Describe the fundamental properties of banach spaces.	K1& K2
CO 2	Implement Operator theory of Operators on a Hilbert space.	K3
CO 3	Test the notions of dot product and Hilbert space.	K4
CO 4	Analyse the spectral theorem to the resolution of integral equations.	K5
CO 5	Create the fixed point theorem to solve differential equations and integral equations.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	2	1
CO 2	3	3	3	2	3	1
CO 3	3	3	3	3	3	2
CO 4	2	3	3	3	3	2
CO 5	2	2	3	3	3	3

High Correlation: 63.33% Moderate Correlation: 29.90% Low Correlation: 6.67%

**DIFFERENTIAL GEOMETRY
PMAM412**

Semester : IV
 Category : Major Core XI
 Class &Major: II M.Sc Mathematics

Credit : 4
 Hours/Week : 5
 Total Hour : 65

Course Objectives:

CO.NO	To enable the students
CO-1	Understand the concept of curvature of a space curve and signed curvature of a plane curve, fundamental theorem for plane curves, space curves.

CO-2	Recognie the intrinsic properties of a surface.
CO-3	Discuss the geodesics on a surface and their Characterization.
CO-4	Analyse the Second Fundamental Form and curvature.
CO-5	Formulate the Fundamental Equations of Surface Theory.

UNIT-I SPACE CURVES

13 Hours

Definition of a space curve – Arc length – tangent – normal and binormal – curvature and torsion – contact between curves and surfaces- tangent surface- involutes and evolutes- Intrinsic equations – Fundamental Existence Theorem for space curves- Helies.

UNIT-II INTRINSIC PROPERTIES OF A SURFACE

13 Hours

Definition of a surface – curves on a surface – Surface of revolution – Helicoids – Metric- Direction coefficients – families of curves- Isometric correspondence- Intrinsic properties.

UNIT-III GEODESICS

13 Hours

Geodesics – Canonical geodesic equations – Normal property of geodesics- Existence Theorems – Geodesic parallels – Geodesics curvature- Gauss- Bonnet Theorem – Gaussian curvature- surface of constant curvature.

UNIT-IV NON INTRINSIC PROPERTIES OF A SURFACE

13 Hours

The second fundamental form- Principle curvature – Lines of curvature – Developable - Developable associated with space curves and with curves on surface - Minimal surfaces – Ruled surfaces.

UNIT-V DIFFERENTIAL GEOMETRY OF SURFACES

13 Hours

Compact surfaces whose points are umblics- Hilbert’s lemma – Compact surface of constant curvature – Complete surface and their characterization – Hilbert’s Theorem – Conjugate points on geodesics.

Text Book

- T.J.Willmore, *An Introduction to Differential Geometry*, Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)

Reference Books

- Struik, D.T. *Lectures on Classical Differential Geometry*, Addison – Wesley, Mass. 1950.
- Kobayashi. S. and Nomizu. K. *Foundations of Differential Geometry*, Inter science Publishers, 1963.
- Wilhelm Klingenberg: *A course in Differential Geometry*, Graduate Texts in Mathematics, Springer-Verlag 1978.
- J.A. Thorpe *Elementary topics in Differential Geometry*, Under- graduate Texts in Mathematics, Springer - Verlag 1979.

Course Outcomes:

CONo.	On completion of this course, students will be able to	Bloom's Level
CO 1	Recall the Fundamental Existence theorem for Space curves. Explain the fundamentals of differential geometry primarily by focusing on the surfaces.	K1&K2
CO 2	Examine and apply the concept of Geodesics.	K3
CO 3	Analyse the concept of Non intrinsic properties of a surface.	K4
CO 4	Develop arguments in the geometric description of curves and Surfaces	K5
CO 5	Construct Hibert's Lemma and Conjugate points on geodesics.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3
CO 5	3	3	1	2	3	3

High Correlation – 63%

Moderate Correlation – 34%

Low Correlation – 3%

MECHANICS

PMAM413

Semester : IV

Category : Major Core XII

Class & Major: II M.Sc Mathematics

Credit : 4

Hours/Week : 5

Total Hours : 65

Course Objectives:

CO No.	To enable the students
CO-1	Understand the concept of a mechanical system and its components.
CO-2	Define generalized coordinates and recognize the role of constraints in mechanical systems.
CO-3	Derive Lagrange's equations for mechanical systems.
CO-4	Analyze the concept of separability in the context of Hamilton-Jacobi theory.
CO-5	Apply special transformations and Lagrange/Poisson brackets in canonical transformations.

UNIT-I MECHANICAL SYSTEMS**13 Hours**

The Mechanical system- Generalised coordinates – Constraints - Virtual work - Energy and Momentum

UNIT-II LAGRANGE'S EQUATIONS**13 Hours**

Derivation of Lagrange's equations- Examples- Integrals of motion.

UNIT-III HAMILTON'S EQUATIONS**13 Hours**

Hamilton's Principle - Hamilton's Equation - Other variational principle.

UNIT – IV HAMILTON-JACOBI THEORY**13 Hours**

Hamilton Principle function – Hamilton-Jacobi Equation - Separability

UNIT-V CANONICAL TRANSFORMATION**13 Hours**

Differential forms and generating functions – Special Transformations– Lagrange and Poisson brackets.

Text Book

- D. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985.

Reference Books

- H. Goldstein, *Classical Mechanics*, (2nd Edition) Narosa Publishing House, New Delhi.
- N.C.Rane and P.S.C.Joag, *Classical Mechanics*, Tata McGraw Hill, 1991.
- J.L.Synge and B.A.Griffith, *Principles of Mechanics* (3rd Edition) McGraw Hill Book Co., New York, 1970.

Course Outcomes:

CO.No	On completion of this course, students will be able to	Bloom's Level
CO 1	Define mechanical systems and their components. Identify and discuss the significance of generalized coordinates.	K1 &K2
CO 2	Apply Hamilton's equations to describe the dynamics of mechanical systems.	K3
CO 3	Analyze alternative variational principles and their applications.	K4
CO 4	Evaluate the effectiveness of different variation principles in specific contexts.	K5
CO 5	Construct the Lagrange and Poisson Brackets	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	3	2	3
CO 2	3	2	3	2	2	3
CO 3	2	3	2	3	2	2
CO 4	3	3	3	3	3	3

CO 5	3	3	1	2	3	3
High Correlation – 77%		Moderate Correlation – 23%		Low Correlation - NIL		

RESOURCE MANAGEMENT TECHNIQUES
PMAM414

Semester : IV **Credit : 3**
Category : Major Core XII **Hours/Week : 5**
Class & Major: II M.Sc Mathematics **Total Hours : 65**

Course Objectives:

CO No.	To enable the students
CO-1	Define and understand Integer Linear Programming.
CO-2	Explore various types of Integer Programming Problems.
CO-3	Apply Gomory’s All Integer Cutting Plane Method.
CO-4	Explore single goal with multiple sub-goals, equally ranked multiple goals, and general Goal Programming models.
CO-5	Analyze factors involved in inventory problem analysis

UNIT - I LINEAR PROGRAMMING

13 Hours

Integer Linear Programming – Types of Integer Programming Problems – Gomory’s All Integer Cutting Plane Method - Gomory’s Mixed Integer Cutting Plane Method. Sensitivity Analysis – Change in Objective Function Coefficient – Addition of New Variable – Addition of New Constraint.

UNIT - II GOAL PROGRAMMING

13 Hours

Goal Programming – Difference between LP and GP approach – Concept of Goal Programming - Goal Programming model formulation – Single Goal with Multiple sub Goals – Equally ranked Multiple Goals – Ranking and Weighting of Unequal Multiple Goals - General GP Model –Graphical Solution method of GP – Modified Simplex Method of GP.

UNIT-III DECISION MAKING PROCESS

13 Hours

Decision Theory – Steps of Decision making process – Types of Decision Making Environments – Decision Making under Uncertainty - Decision Making under Risk - Expected Monetary Value. Theory of Games –Two Person Zero Sum Games –Games with Saddle Point –Rules to determine Saddle point -Games without Saddle Point -Related problems

UNIT IV INVENTORY CONTROL

13 Hours

Deterministic Inventory Control models – Meaning of inventory control – Reasons for carrying inventory – Factors involved in inventory problem analysis - Inventory cost components – Demand for inventory items - Replenishment lead time - Length of planning period – Inventory model building – Single item inventory control modes without shortages.

UNIT V DYNAMIC PROGRAMMING

13 Hours

Dynamic Programming – Dynamic Programming Terminology – Developing Optimal Decision Policy – General Algorithm- Dynamic Programming Under Certainty – Model-I: Shortest Route Problem – Model-II: Multiple Separable Return Function and Single Additive Constraint -Dynamic Programming Approach for Solving Linear Programming Problems.

Text Books:

- J.K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd., Fourth Edition, (2010).

Reference:

- Prem Kumar Gupta and D.S. Hira, Operations research, S. Chand, (2000).
- Kantiswarup, P.K. Gupta and Manmohan, Operations Research, Sultan Chand & Sons, (2009).

Course Outcomes:

CONo.	On completion of this course, students will be able to	Bloom’s Level
CO 1	Define and explain Integer Linear Programming.	K1 &K2
CO 2	Apply Gomory’s All Integer Cutting Plane Method	K3
CO 3	Analyze the impact of changes in the objective function coefficients, addition of new variables, and addition of new constraints.	K4
CO 4	Develop single-item inventory control models without shortages.	K5
CO 5	Construct the Dynamic Programming to solve linear programming problems.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	2	2	3	2	2	3
CO 3	2	3	2	2	2	2
CO 4	3	3	3	3	3	3
CO 5	2	3	3	3	3	3

High Correlation – 67% Moderate Correlation – 33% Low Correlation - NIL

**PROBLEM SOVING IN ADVANCED MATHEMAICS
PMAC401**

Semester : IV Credit : 2
 Category : Professional Competency Skills (SEC) Hours/Week : 4
 Class & Major: II M.Sc Mathematics Total Hours : 52

Course Objectives:

CO No.	To enable the students
CO-1	Understand Riemann sums, Riemann integral, and improper integrals.
CO-2	Study functions of several variables, covering directional derivatives and partial derivatives.

CO-3	Apply Bayes' theorem and probability inequalities (Tchebyshef, Markov, Jensen).
CO-4	Explore fundamental theorems of arithmetic, divisibility in \mathbb{Z} , and congruences.
CO-5	Introduce Lebesgue measure and Lebesgue integral.

UNIT I - LIMIT CONTINUITY DIFFERENTIABILITY 10 Hour

Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. Sequences and series, convergence, \limsup , \liminf . Bolzano Weierstrass theorem, Heine Borel theorem.

UNIT II - MONOTONIC DIFFERENTIABILITY 10 Hour

Sequences and series of functions, uniform convergence. Riemann sums and Riemann integral, Improper Integrals. Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue measure, Lebesgue integral.

UNIT III- COMPLEX ANALYSIS 10 Hour

Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchy's theorem.

UNIT IV- COMPLEX VARIABILITY 12 Hour

Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations. Fundamental theorem of arithmetic, divisibility in \mathbb{Z} , Congruences, Chinese Remainder Theorem, Euler's ϕ - function, primitive roots.

UNIT IV – PROBLEMS IN NUMBER THEORY 10 Hour

Exploratory data analysis Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate); expectation and moments.

Text Book

- Pawan Sharma, Suraj Singh, Anshuman, UGC CSIR NET/SET (JRF & LS) Mathematical Sciences, Arihant Publisher, 2016.

Reference:

- CSIR-NET Toppers Handwritten Notes- Mathematical Science – 8 books- Latest Edition 2020.
- Tripathi A. M., Truemans CSIR Mathematical Sciences, Trueman's Publisher.
- P.C. Mittal, Ritesh Mishra, Joint CSIR UGC-NET Mathematical Sciences (Part-B & C) Exam Guide, Ramesh Publishing House, 2020

Course Outcomes:

CONo.	On completion of this course, students will be able to	Bloom's Level
CO 1	Understand elementary set theory and its applications and Demonstrate knowledge of finite, countable, and uncountable sets.	K1 &K2
CO 2	Apply the Cauchy-Riemann equations and explore analytic functions.	K3
CO 3	Analyze Taylor series, Laurent series, and the calculus of residues.	K4
CO 4	Determine distribution functions, expectations, and moments for univariate and multivariate random variables.	K5
CO 5	Discuss discrete probability, independent events, and Bayes' theorem.	K6

Course Mapping:

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	2
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	2
CO 4	3	3	3	2	2	3
CO 5	3	3	3	3	3	2

High Correlation – 83% Moderate Correlation – 17% Low Correlation - NIL

III and IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component III	Component IV
III	Major Core VII	PMAM315	Complex Analysis	Assignment	Term Paper
III	Major Core VIII	PMAM316	Probability Theory	Assignment	Seminar
III	Major Core IX	PMAM317	Topology	Assignment	Term Paper
III	Core Industrial Module	PMAM320	Industrial Statistics	Assignment	Seminar
III	Elective V(DSE)	PMAM318	Algebraic Number Theory	Assignment	Term Paper
III	Elective VI(DSE)	PMAM319	Industrial Operations Research	Assignment	Problem Solving
III	SEC III -Inter Disciplinary	PMAI301	Research Methodology: Methods & Techniques	Assignment	Term Paper

IV	Major Core X	PMAM411	Functional Analysis	Assignment	Seminar
IV	Major Core XI	PMAM412	Differential Geometry	Assignment	Term Paper
IV	Major Core XII	PMAM413	Mechanics	Assignment	Seminar
IV	Elective VII(DSE)	PMAM414	Resource Management Techniques	Assignment	Term Paper
IV	Professional Competency Skills(SEC)	PMAC401	Problem Solving in Advanced Mathematics	Assignment	Seminar

DEPARTMENT OF COMPUTER SCIENCE

PREAMBLE

UG : Programme Profile and Syllabi of Courses from III to IV semesters along with Evaluation Components III and IV (With effect from 2023-2026 Batch Onwards)

PROGRAMME SPECIFIC OUTCOME

PSO 1	Understand the fundamental principles and theories of computer science, including algorithms, data structures, programming languages, and computer architecture
PSO 2	Create proficiency in multiple programming languages and software development tools to design, implement, and test software solutions
PSO 3	Apply problem-solving skills and critical thinking to analyze and Knowledge for developing server based Languages such as Node.js, PHP, ASP.NET/C#, Pythonetc.,.
PSO 4	Analyze the principles of computer security and adhere to ethical and professional standards in computer science, including issues related to intellectual property, privacy, and social responsibility.
PSO 5	Develop software projects in teams to collaborate and demonstrate effective communication and project management skills based on emerging technologies such as cloud Computing, Big data, and Artificial intelligence, Internet of things, and apply them to solve real-world problems.

PROGRAMME PROFILE – B.SC COMPUTER SCIENCE

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit Min/Max
I	I	Language: Tamil/ Hindi/ French	UTAL110/ UHIL102 UFRL102	General Tamil-I/ Hindi-I/ French-I	5	3
	II	Language: English	UENL111	General English	5	3
	III	Core Courses - I	UCSM111/ UCAM111/ UITM101	Object Oriented in Python Programming	5	4
	III	Core Courses - II	UCSR111 UCAR112 UITR101	Python Programming using OOPs Practicals	5	4
	III	Elective Course 1 (Generic / Discipline Specific)	UMAA122	Numerical Methods	4	3
	IV	Foundation Course FC	UCSF101 UCAF101/	Problem Solving Computation	2	2
	IV	Skill Enhancement Course SEC-1 (Non Major Elective			2	2

	IV	Ability Enhancement Compulsory Course (AECC 1) -Soft Skill	USKS103	Soft Skill-1- Communicative English	2	2
Total					30	23
II	I	Language : Tamil/ Hindi/ French	UTAL210/ UHIL201 UFRL201	General Tamil II/ Hindi-II/ French-II	5	3
	II	LE: Language	UENL211	General English	5	3
	III	Core Courses - III	UCSM209/ UCAM208/ UITM201	Advanced Data Structures & Algorithms	5	4
	III	Core Courses - IV	UCSR208/ UCAR208/ UITR202	Advanced Data Structure and Algorithms – Practicals	5	4
	III	Elective Course –II (Generic / Discipline Specific)	UMAA226	Graph Theory and its applications	4	3
	IV	Skill Enhancement Course SEC-3 (Discipline / Subject Specific)	UCSD201/ UCAD201	PHP Programming	2	2
	IV	Skill Enhancement Course SEC-1 (Non Major Elective)			2	2
	IV	Ability Enhancement Compulsory Course (AECC 2) Soft Skill-2	USKS203	Soft Skill-2	2	2
	III	Internship / Industrial Training	UINS201	Internship / Industrial Training		-/ 2
	V	Extension Activity/ Physical Education/ NCC				1/2
	VI	Value added courses (Outside class hours)	CCSC201			-/2
Total					30	24/29
III	I	Language: Tamil/ Hindi/ French	UTAL310/ UHIL301 UFRL301	General Tamil-III/ Hindi-III/ French-III	5	3
	II	Language: English	UENL311	General English	5	3
	III	Core Course - V	UCSM308 UCAM308/	Microprocessor Architecture	4	4
	III	Core Course – VI	UCSR309/ UCAR309	Microprocessor Architecture- Practical	4	4
	III	Elective Course 3 (Generic / Discipline Specific) -EC3	UMAA311	Discrete Mathematical Structures	4	3
	IV	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	UCSR310	PHP Programming- Practical	2	2
	IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	UCSU301/ UITU301/ UCAU301	Graphics Design	2	1

	IV	Ability Enhancement Compulsory Course (AECC 3) Soft Skill-3	USKS301	Soft Skill-3	2	2
	IV	Value Education	UGEV301	Value Education	2	2
Total					30	24
IV	I	Language: Tamil/ Hindi/French	UTAL409/ UTAL410	General Tamil IV/ Hindi-II/ French-II	5	3
	II	Language: English	UENL410	General English	5	3
	III	Core Course - VII	UCSM410 UCAM408 / UITM401	Industry Module : Java Application Programming	5	4
	III	Core Course - VIII	UCSR413 UCAR409/ UITR403	Java Application Programming – Practicals	5	4
	III	Elective Course - EC4 (Generic)	UMAA404	Statistics Analysis using R	4	3
	IV	Skill Enhancement Course – SEC-6 (Discipline Specific)	UCSD401	Cloud Computing Services	2	2
	IV	Skill Enhancement Course- Online course	UONL401	Online Course *	2	2
	IV	Ability Enhancement Compulsory Course (AECC 4) Soft Skill-4	USKS401	Soft Skill-4	2	2
	III	Internship / Industrial Training	UINS401	Internship / Industrial Training	-	-/ 2
	V	Extension Activity/ Physical Education/NCC			-	-/2
	VI	Value added course (Outside class hours)	VCSC401		-	-/2
	Total					30	23/29
V	III	Core Course - IX	UCSM513	Software Engineering and Modeling	5	4
	III	Core Course - X	UCSM514	Advanced Database Management System	5	4
	III	Core Course - XI	UCSR513	Advanced Database Management System – Practical	5	4
	III	Elective Course – EC5 (Generic / Discipline Specific)	UCSD501 UCSD502 UCSD503	1. System Control Software 2. System Programming 3. Linux Programming	5	3
	III	Elective Course – EC6 (Generic / Discipline Specific)	UCSD504 UCSD505 UCSD506	1. Data Mining and Warehousing 2. System Administration and Maintenance 3. Artificial Neural Networks	4	3
	III	Core Course - XII	UCSP502	Project with Viva voce	4	4
	IV	Environmental Studies	UGEV501	Environmental studies	2	2
Total					30	24
	III	Core Course - XIII	UCSM616	Computer Networks	5	4
	III	Core Course - XIV	UCSM617	.NET Framework	5	4
	III	Core Course - XV	USCR610	.NET Framework -Practical	5	4

VI	III	Elective Course – EC7 (Generic / Discipline Specific)	UCSD601/ UCSD602/ UCSD603/	1. Introduction to Data Science 2. Machine Learning 3. Parallel Algorithm	6	4
	III	Elective Course – EC8 (Generic / Discipline Specific)	UCSD604/ UCSD605/ UCSD606/	1.Cyber Security 2.Information Security 3.Network Security	5	3
	III	Comprehensive Viva-voce			-	1
	IV	Professional Competency Skill Enhancement Course SEC8	UCSC601	Professional Competency	4	2
	III	Internship / Industrial Training (semester vacation 30 Hrs)	UINS601	Internship / Industrial Training	-	-/2
	V	Extension Activity/ Physical Education/NCC			-	-/2
VI	VALUE ADD COURSE			-	-	
Total					30	22/26
OVERALL TOTAL					180	140/155

NON MAJOR ELECTIVE

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Skill Enhancement Course (Non Major Elective)	UCSE101/ UITE101 UCAE101	Office Automation	2	2
II	Skill Enhancement Course- SEC-2 (Non Major Elective)	UCSE211/ UITSE211/ UCAE211	Advanced Excel	2	2

ALLIED COURSES OFFERED TO OTHER DEPARTMENTS

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	III	Generic(EC1)	UCSA107	Fundamentals of Artificial Intelligence	4	3
I	III	Allied Practical	UCSR112	Fundamentals of artificial intelligence– lab	2	1
II	III	Generic(EC2)	UCSA206	Programming with C++	4	3
III	III	Generic(EC3)	UCSA308	Business Analytics And Intelligence	2	2
III	III	Allied Practical	UCSR316	Business Analytics And Intelligence Lab	2	1
III	III	Generic(EC4)	UCSA309	Programming Language With Python	4	3
IV	III	Generic(EC4)	UCSA409	Digital Marketing	2	2
IV	III	Allied Practical	UCSR414	Web Design using Microsoft Expression Web4 – Lab	2	1
V	III	Generic(EC5)	UCSA511	Mobile Computing	4	3
VI	III	Generic(EC6)	UCSA601	Web Designing	5	3

**EXTRA CREDIT EARNING
PROVISIONSELF STUDY**

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Self-study Paper	UCSS101 UCSS102	C Programming Practical: C Programming	2	2
II	Self-study Paper	UCSS201 UCSS202	Desktop Publishing Hardware Trouble Shooting	2	2
III	Self-study Paper	UCSS301 UCSS302	Web Application Development Practical: Web Application Development.	2	2
IV	Self-study Paper	UCSS401 UCSS402	User Interface DesignDevops	2	2
V	Self-study Paper	UCSS501 UCSS502	Internet of Things Natural Language Processing	2	2
VI	Self-study Paper	UCSS601 UCSS602	Image Processing Computing Intelligence	2	2

MICROPROCESSOR ARCHITECTURE

UCSM308/UCAM308

Semester	:III	Credit	: 4
Category	: Core Course V	Hour/Week	: 4
Class&Major	: II B.Sc Computer Science	Total Hour	:52

COURSE OBJECTIVES:

Cos	To enable the students
CO1	Acquire skill about the microprocessor's evaluation.
CO2	Understand the 8085 instructions set.
CO3	Explore techniques for multiplication and division of numbers using assembly language.
CO4	Apply the types of convertors in Counters.
CO5	Utilize the microprocessor in various applications.

UNIT- I EVOLUTION OF MICROPROCESSORS

10 Hour

Single Chip Microcomputer Microprocessor Applications – Programming Digital Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085/8086/80386 – Instruction Cycle – Timing diagram.

UNIT- II INSTRUCTION SET OF INTEL 8085

11 Hour

Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions – Programming of Microprocessors – Assembly language – Assemblers – Stacks and Subroutines – MACRO – Microprogramming. Introduction to 8086 – architecture – pin description – External memory interfacing – buscycle –some important companion chips - Maximum mode bus cycle-memory interfacing. The 80386 Modes of Operation

UNIT- III ASSEMBLY LANGUAGE PROGRAMMING

10 Hour

Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array – Arranging a series of numbers – Sum of a

series of Numbers – Multiplication – Division – Multi byte Addition and Subtraction.

UNIT- IV PERIPHERAL DEVICES AND INTERFACING

10 Hour

Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface – Programmable Counter / Interval Timer – A/D Converter and D/A Converter.

UNIT- V MICROPROCESSOR APPLICATIONS

11 Hour

Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

Text Books

- Badri Ram (2013). *“Fundamentals of Microprocessors and Microcomputers”*, Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons.
- Douglas V. Hall (2015). *“Microprocessors and Interfacing”*, Tata Mcgraw Hill.

Reference Books

- Ramesh S (2011). Gaonkar, *“Microprocessor Architecture”*, Programming and Applications with the 8085 / 8080A, Wiley Eastern.
- Barry B. Brey (2000). *“The Intel Microprocessors – 8086/8088, 80186, 286, 386, 486, Pentium Pro Processor”*, Prentice Hall of India Pvt. Ltd.

e-Resources

- <https://www.geeksforgeeks.org/architecture-of-8085-microprocessor/>
- <https://www.slideshare.net/slideshow/introduction-to-assembly-language-250123883/250123883>

COURSE OUTCOMES:

CO No.	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Acquire the basic Knowledge of Microprocessor.	K1, K2
CO2	Examine the concept of Assembly language program	K3
CO3	Analysis the skill about Input and output Interfacing.	K4
CO4	Develop the Microprocessor based A/D and D/A converter	K5
CO5	Explore the programming knowledge using 8085.	K6

CO-PSO MAPPING

CO- PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION - 60% MODERATE CORRELATION - 33.33% LOW CORRELATION - 6.66%

MICROPROCESSOR ARCHITECTURE - PRACTICALS
UCAR309/UCSR309

Semester	: III	Credit	: 4
Category	: Core Course VI	Hour/Week:	4
Class & Major	: II B.Sc Computer Science	Total Hour	: 52

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Acquire skill about the microprocessor's evaluation
CO2	Understand the 8085 instructions set.
CO3	Examine the ASCII Code generation.
CO4	Illustrate the process of convertors.
CO5	Develop the microprocessor in various applications.

LAB EXCERICES

1. Program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. Perform multiplication and division of two 8 bit numbers using 8085.
4. Find the largest and smallest number in an array of data using 8085 instruction set.
5. Program to arrange an array of data in ascending and descending order.
6. Convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085instruction set.
7. Program to initiate 8251 and to check the transmission and reception of character.
8. Interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six differentmodes.
9. Interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.
10. Serial communication between two 8085 through RS-232 C port.

Text Books

- Badri Ram (2013). " *Fundamentals of Microprocessors and Microcomputers*", Fourth Revised andEnlarged Edition,Dhanpat Rai and Sons.
- Douglas V. Hall (2015), " *Microprocessors and Interfacing*", Tata Mcgraw Hill.

Reference Books

- Ramesh S.Gaonkar (2011). " *Microprocessor Architecture, Programming and Applications with the*

8085 / 8080A”, Wiley Eastern.

- Barry B. Brey (2000), "The Intel Microprocessors – 8086/8088,80186,286,386,486, Pentium Pro Processor", Prentice Hall of India Pvt. Ltd.

e-Resources

- <https://electronicsforu.in/8085-addition-and-subtraction-programs/>
- <https://www.javatpoint.com/programming-in-8085>

COURSE OUTCOMES:

CO.No	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Acquire the basic Knowledge of Microprocessor.	K1,K2
CO2	Examine the concept of Microprocessor Applications	K3
CO3	Analysis the skill about Peripheral Devices and Interfacing.	K4
CO4	Develop the microprocessor in various applications.	K5
CO5	Explore the programming knowledge using 8085.	K6

CO - PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	2	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION - 60% MODERATE CORRELATION - 36.67% LOW CORRELATION - 3.33%

PHP PROGRAMMING –PRACTICALS

UCSR310

Semester : III

Credit : 2

Category : Skill Enhancement Course -SEC-5(Discipline)

Hour/Week : 2

Class & Major : II B.Sc Computer Science

Total Hour : 26

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand the basic concepts of PHP and its essentials.
CO2	Create functions, web pages and how to implement PHP programs.
CO3	Learn how to implement PHP programs using object-oriented programming concepts.
CO4	Understand the concept of date and time manipulation in PHP.
CO5	Embedding PHP within HTML to create dynamic web pages.

LIST OF EXERCISE:

1. Greeting text.
2. Palindrome or not.
3. Nesting of function.
4. Calculator program.
5. Age calculator program.
6. String palindrome or not.
7. Program using function.
8. Login page without SQL connection.
9. Array manipulation.
10. Simple todo list

Text Book

- Steven Holzner,(2020), “*The PHP Complete Reference*”, McGraw Hill Education, New York

Reference Book

- Vikram Vaswani , (2009) . “*PHP: A Beginner's Guide*” , McGraw HillEducation, New york.

e- Resources

- https://www.tutorialspoint.com/php/php_tutorial.pdf
- <https://www.php.net/manual/en/tutorial.php>

COURSE OUTCOMES:

Co No	On completion of the course, the student will be able to	Bloom's Level
CO1	Design a PHP script that dynamically generates a personalized greeting based on user input.	K1,K2
CO2	Assess the calculator's performance and accuracy, and consider possible improvements	K3
CO3	Create a basic PHP to-do list that allows users to add, view, and remove tasks	K4
CO4	Identify the syntax and purpose of PHP functions.	K5
CO5	Explain how PHP functions help in structuring and organizing code	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3

CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 72 %

Moderate Correlation -24%

Low Correlation-4%

GRAPHICS DESIGN
UCSU301/UITU301/ UCAU301

Semester : III

Credit :1

Category : Core Course VI

Hour/Week: 2

Class &Major : II B.Sc Computer Science

Total Hour : 26

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand about graphic design - its history and evolution along with its technology, and concepts.
CO2	Create the Principles of Graphic Design.
CO3	Apply the design principles and its uses
CO4	Analyze the different design processes and problem solving methods
CO5	Implement the techniques involved graphics design

UNIT-I FUNDAMENTALS OF DESIGN

5 Hours

Introduction to Graphic Design: Definition and history-Importance in communication-Basic Elements of Design:Point, line, and plane-Shape and form-Texture and pattern. Principles of Composition: Balance and symmetry, Scale and proportion, Rhythm and movement

UNIT-II COLOR THEORY AND APPLICATION

5 Hours

Color Basics: Color wheel and color relationships , Warm vs. cool colors. Color Theory: Color harmony and schemes-Psychological and cultural meanings of color. Applying Color in Design: Color in digital and print media, Techniques for effective color use.

UNIT-III TYPOGRAPHY AND TEXT

5 Hours

Basics of Typography: Type anatomy and terminology-Type families and classifications. Principles of Typographic Design : Hierarchy and readability-Alignment, spacing, and grids. Advanced Typography-Expressive and experimental typography-Typography in branding and identity

UNIT-IV IMAGERY AND GRAPHICS

5 Hours

Working with Images: Types of images (vector vs. raster)-Image resolution and quality-Image Composition and Editing-Cropping, scaling, and color correction-Integrating images with

text and graphics. Creating Original Graphics: Drawing and illustration techniques-Using software tools for graphic creation

UNIT-V DESIGN SYSTEMS AND APPLICATIONS

6 Hours

Layout and Grid Systems-Creating and using grids in design-Responsive and adaptive layouts. Branding and Identity Design-Developing a visual identity system-Logo design and application. Advanced Design Projects-Multi-page documents (e.g., brochures, magazines)-Interactive and digital design

Text Book

- Ellen Lupton & Jenfer Cole Phillips,(2015). “*Graphic Design: The New Basics*” Princeton Architectural Press Revised and updated edition.

Reference Books

- Edmund C.Arnold, (2020).*Modern News paper designs Harper &Rowpublishers, NEW YORK..*
- Click J.W, Russell and N.Baird,(2021).”*Magazine Editing and production*”,Dubuque Iowa, WM.Brown .

e-Resources

- <https://edu.gcfglobal.org/en/beginning-graphic-design/fundamentals-of-design/1/>
- <https://study.com/academy/lesson/types-of-images-rasterized-vector-compound-graphics.html>

COURSE OUTCOMES:

Co.No	On completion of the course, the student will be able to	Bloom’s Level
CO1	Understand the elements of design, principles of design and Aesthetics of design.	K1,K2
CO2	Apply the process of points, lines, and planes to create visual interest and structure in your designs..	K3
CO3	Describe the different types of fonts and effective use of Typography..	K4
CO4	Compare the dynamics of composition and color and the technical issues surrounding print and web distribution.	K5
CO5	Develop the new layout using techniques of Graphic Designer	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 69 %

Moderate Correlation -21%

Low Correlation-10%

INDUSTRY MODULE : JAVA APPLICATION PROGRAMMING

UITM401/UCSM410/ UCAM408

Semester : IV

Credit : 4

Category : Core VII

Hour/Week : 5

Class & Major : II B.Sc Computer science

Total Hour : 65

COURSE OBJECTIVES:

CO.NO.	To enable the students
CO1	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
CO2	Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO3	Examine the important topics and principles of software development.
CO4	Create the ability to write a computer program to solve specified problems.
CO5	Design the Java SDK environment to create, debug and run simple Java programs

UNIT- I INTRODUCTION

13 Hours

Data Types, Variables and Arrays: Primary types – Integers – Floating point types – Characters – Booleans – Literals – Variables – Type Conversion and Casting – Automatic type Promotion in Expressions - One Dimensional Arrays– Multi Dimensional Arrays. Operators: Arithmetic Operators – Bitwise operators – Relational Operators – Boolean Logical Operators – Assignment Operator – Conditional Operator – Operator Precedence-Using parentheses.

UNIT-II OBJECT ORIENTED PROGRAMMING CONCEPTS

13 Hours

Class Fundamentals – Declaring objects- Assigning object Reference variables- Introducing Methods- Constructors-Garbage collection – Finalize() Method A Closer Look at Methods and classes: Overloading Methods-Using objects as parameters Argument passing –Returning objects- Recursion- Introducing Access control – understanding static –Introducing final – Nested and Inner classes- String class- Using command line arguments. Inheritance: Inheritance Basics –Using super- creating Multilevel Hierarchy - Method overriding –Dynamic Method Dispatch –Using Abstract class –Using final with inheritance-The object class.

UNIT- III PACKAGES AND THREADS

13 Hours

Packages –Access Protection – Importing packages-Interfaces. Exception Handling: Introduction- Exception Types – Uncaught Exceptions- Using try and catch – Multiple catch clauses –Nested try statements- throw – throws-finally. Multithreaded programming : Java Thread Model –Main Thread – Creating a Thread –Creating Multiple Threads – Using is Alive() and join() –Thread priorities.

UNIT -IV APPLETS

13 Hours

Applet Basics – Applet Architecture –Applet Skeleton- Applet Display method – Requesting

Repainting – HTML APPLET tag- Passing Parameters to Applet. Event Handling: Event Handling Mechanisms –Delegation Event Model –Event classes(The Action Event ,Item Event , Key Event, Mouse Event) – Sources of Events - Event Listener Interfaces(Action Listener, Item Listener, Key Listener, Mouse Listener).

UNIT- V INTRODUCTION TO AWT

13 Hours

AWT Classes – Window fundamentals – working with Frame Windows –working with Graphics– Working with color – Working with Fonts- AWT Controls

CASE STUDY-Develop a Java application prototype for the shopping cart functionality. Include features such as adding/removing items, updating quantities, and calculating the total price.-Design an educational platform in Java with HTML integration for course management, content delivery, and student interaction. Define the backend services for user authentication, course enrollment, and lesson delivery.

Text Book

- Herbert Schildt(2014). “Java - The Complete Reference”, Ninth Edition,McGrawHill Education.

Reference books

- E. Balagurusamy(2014). “Programming with Java”, Tata McGraw-HillEducation India.
- Sachin Malhotra & Saurabh Choudhary(2015). “Programming in JAVA”,2nd Ed,

e-Resources

- <https://www.programiz.com/java-programming>
- <https://www.w3schools.com/java/>
- <https://www.javatpoint.com/java-tutorial>
-

COURSE OUTCOMES:

CO	On completion of the course the student will be able to	Bloom’s level
CO1	Understand the Competence on the development of small tomedium sized application programs that demonstrate professionally acceptable coding.	K1,K2
CO2	Apply the concept of object oriented programming throughJava.	K3
CO3	Analyze the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program.	K4
CO4	Evaluate the concepts of java programs for applets and graphics programming.	K5
CO5	Design the fundamental concepts of AWT controls, layouts andevents.	K6

CO - PSO MAPPING

CO- PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	3	3	2	3	2

CO2	3	3	2	3	3	3
CO3	3	3	3	2	2	2
CO4	3	3	2	1	3	3
CO5	3	3	3	3	3	2

HIGH CORRELATION - 70% MODERATE CORRELATION - 26.67% LOW CORRELATION - 3.33%

JAVA APPLICATION PROGRAMMING PRACTICALS

UCSR413/UITR403/UCAR409

Semester : IV
Category : Core VIII
Class & Major : II B.Sc Computer science

Credit : 4
Hour/Week : 5
Total Hour : 65

COURSE OBJECTIVES:

Co. No	To Enable The Students
CO1	Understand the objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its application through hands-on training.
CO2	Examine the Object, Class, inheritance and recursion concepts in Java programming.
CO3	Implement and gain knowledge in packages, interfaces, exception and thread handling.
CO4	Implement AWT classes and windows fundamentals.
CO5	Create the programs to implement graphics, applets and event handling.

LAB EXERCISES

1. Extract a portion of a character string and print the extracted string.
2. Sort the given names in alphabetical order.
3. Multiply two given matrices using Multi-Threading Concepts.
4. Prepare a mark sheet using Abstract classes.
5. Find the area of a rectangle using constructor.
6. Find out the factorial of a given number using recursion.
7. Illustrate the concept of multiple inheritances.
8. Implement user defined packages and interfaces.
9. Implement the concept of exception handling.
10. Implement the concept of multithreading.
11. Applet to draw several shapes using graphics.
12. Applet to implement event handling.

13. Applet program to display a Bar chart using Swing Concepts..
14. Implement a calculator using AWT controls.
15. Display an analog clock using Graphics.

Text Books

- E. Balagurusamy(2019). “*Programming with Java – A Primer*” , TMH. ,5th Edition.

Reference books

- Patrick Naughton & Hebert Schildt(1999), The Complete Reference Java 2, 3rd Edition, TMH.
- John R. Hubbard(2004), Programming with Java,2nd Edition, TMH.

e-Resources

- <https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf>

COURSE OUTCOMES

CO.NO	On completion of the course the student will be able to	Bloom’s Level
CO1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding	K1,K2
CO2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, and inheritance.	K3
CO3	Construct Java programs using Multithreaded Programming and Exception Handling.	K4
CO4	Implementation of AWT controls, layouts and windows fundamentals	K5
CO5	Create the programs to implement graphics, applets and event handling	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	2
CO2	3	3	3	3	3	3
CO3	3	3	3	2	3	2
CO4	3	3	2	2	3	3
CO5	3	3	3	3	2	1

HIGH CORRELATION - 73.34% MODERATE CORRELATION - 23.33% LOW CORRELATION - 3.33%

CLLOUD COMPUTING SERVICES

UCSD401

Semester : IV

Credit : 2

Category : Skill Enhancement-SEC VI

Hour/Week : 2

Class & Major : II B.Sc Computer Science

Total Hour : 26

COURSE OBJECTIVE:

Co.No	To Enable The Students
CO1	Understand the fundamental concepts and Technologies of Cloud Computing.
CO2	Compare the various cloud service and its types.
CO3	Apply learn about Cloud Architecture and Application design.
CO4	Demonstrate the various aspects of application design, benchmarking and security on the Cloud.
CO5	Create the various Case Studies in Cloud Computing.

UNIT-I INTRODUCTION TO CLOUD COMPUTING

5 Hour

Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity

UNIT-II COMPUTER SERVICES:

5 Hour

Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store

UNIT-III CLOUD APPLICATION DESIGN

6 Hour

Cloud Application Design: Introduction – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC).

UNIT-IV CLOUD APPLICATION BENCHMARKING AND TUNING

5 Hour

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics– Benchmarking Tools and Types of Tests – authentication (SSO) – Authorization – Identity and Access Management.

UNIT-V CASE STUDIES:

5 Hour

Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.

Text Book

- Arshdeep Bahga, Vijay Madiseti(2020). “Cloud Computing – A Hands On Approach”, Universities Press (India) Pvt. Ltd.

Reference Books

- Anthony T Velte, Toby J Velte, Robert Elsenpeter, (2019). “*Cloud Computing: A Practical Approach*”, Tata McGraw-Hill.
- Barrie Sosinsky,(2021). “*Cloud Computing Bible*”, Wiley India Pvt. Ltd.
- David Crookes,(2018). ”*Cloud Computing in Easy Steps*”, Tata McGraw Hill..
- Dr. Kumar Saurabh(2019).”*Cloud Computing*”, Wiley India,2nd Edition.

e- Resources

- https://en.wikipedia.org/wiki/Cloud_computing
- https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7
- <https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf>

COURSE OUTCOMES:

CO.NO	On completion of the course, the student will be able to	Bloom's Level
CO1	Understand the fundamental concepts of cloud computing with emphasis on ethics and principles of professional coding	K1,K2
CO2	Apply the concept of Google Cloud SQL	K3
CO3	Analyze the techniques of Data Storage Approaches	K4
CO4	Estimate the implementation of Benchmarking.	K5
CO5	Construct the Cloud Computing for Manufacturing Industry	K6

CO /PSO MAPPING :

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	2
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	2
CO4	3	3	2	2	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION - 66.66% MODERATE CORRELATION - 30% LOW CORRELATION - 3.34%

ALLIED PAPERS

BUSINESS ANALYTICS AND INTELLIGENCE

UCSA308

Semester : III

Credit : 2

Category : Generic(EC3)

Hour/Week: 2

Class&Major : II B.Com(CA)

Total Hour: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the concepts of business problems and its solutions.
CO-2	Apply Excel add-instructions to solve business problems

CO-3	Analyze different strategy level
CO-4	Summarize data mining process
CO-5	Develop business intelligent system.

UNIT-I INTRODUCTION

6 Hour

Business Intelligence: overview-need for Business Intelligence-information and knowledge- Role of Mathematical models- characteristics of business intelligence -structure and components of business intelligence.

UNIT- II ANALYTICS STRATEGY

5 Hour

Business Analytics at the strategic level: Strategy and BA-Link between strategy and Business Analytics-BA supporting strategy at functional level-Functions-information as strategic resource.

UNIT -III DATA VISUALIZATION

5 Hour

Data visualization-Online Analytical Processing (OLAP)-Reports and Queries - Multidimensionality Advanced Business Analytics.

UNIT -IV DATA MINING

5 Hour

Data Mining definition, objectives and benefits Methods-Applications of DM -Data Mining Software Tools-Data Mining Process-Text and Web DM.

UNIT-V BUSINESSINTELLIGENCE

5 Hour

Business Intelligence Architectures: Cycle of Business Intelligence Analysis- Development of Business Intelligence System- spread sheets.

Text Book

- Turban, Sharda. (2014). *Decision Support and Business Intelligence Systems*. (4th Delen, Pearson.

Reference Books

- Olivia Parr Rud. (2009). "Business Intelligence Success Factors Tools for aligning your business in the global economy". John Wiley and Sons.
- Steve Williams and Nancy Williams. (2007). "The Profit impact of Business Intelligence". Morgan Kauffman Publishers Elsevier.
- Gert H.N. Laursen & Jesper Thorlund. (2010). "Business Analytics for Managers: Taking Business Intelligence beyond reporting". Wiley and SAS Business Series.

e-Resources

- <http://www.w3schools.com/html/>
- https://www.tutorialspoint.com/management_information_system/business_intelligence_system.htm

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's level
CO-1	Understand and critically apply the concepts and methods of business analytics	K1,K2
CO-2	Identify, model and solve decision problems in different areas.	K3
CO-3	Analyze different analytical processing	K4
CO-4	Interpret data mining tools	K5
CO-5	Develop business application in different domains	K6

CO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	2	3
CO2	3	3	3	3	3	3
CO3	3	3	3	2	2	3
CO4	3	3	1	3	3	3
CO5	3	3	3	3	3	3

High Correlation-86.67%, Moderate Correlation –10%, Low Correlation-3.33%

BUSINESS ANALYTICS AND INTELLIGENCE USING SAS LAB UCSR316

Semester : III

Credit : 1

Category : Allied Practical

Hour/Week : 2

Class & Major: II-B.Com(CA)

Total Hour : 26

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concepts of SAS platform for alter, manage and retrieve data
CO-2	Apply filtering methods
CO-3	Analyze the SAS provides of graphical point-and-click user interface.
CO-4	Import Excel to SAS
CO-5	Implement the statistical data for non-technical users

Lab Exercise

1. Logging on to the SAS platform via SAS Enterprise Guide
2. Creating and saving a project SAS Enterprise Guide
3. Importing an Excel File into SAS.
4. Output Formats.
5. Expression builder to create variable using query.
6. Exploring Output Formats and Setting Default

7. Exploring the Data and Creating a Basic Report
8. Summary statistics.
9. Filtering
10. Graphical Exploration

***Note:** Make the programs simpler and easier to understand with basic concepts

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's level
CO-1	Understand the concept of a SAS Enterprise Guide.	K1,K2
CO-2	Identify, model and solve decision problems in different areas.	K3
CO-3	Analyze different analytical processing	K4
CO-4	Interpret the numerical and pictorial summaries of data for Distribution Analysis.	K5
CO-5	Develop the various applications for statistical analysis of data.	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 72 % Moderate Correlation -24% Low Correlation-4%

PROGRAMMING LANGUAGE WITH PYTHON

UCSA309

Semester	: III	Credit	: 3
Category	: Major Allied III	Hours/Week	: 4
Class & Major	: II B.Sc Mathematics	Total Hour	: 52

Course Objectives

CO No.	To enable the students
CO-1	Understand the relationship between computer algorithms and problem-solving.
CO-2	Learn the basics of Python programming, including literals, variables, identifiers, operators, expressions, and data types.
CO-3	Explore the components of computer systems, including hardware and software.
CO-4	Acquire a solid understanding of the Python programming language.
CO-5	Develop skills in input/output operations in Python.

UNIT – I INTRODUCTION

13 Hour

The essence of computational problem solving – Limits of computational problem solving- Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output

UNIT – II CONTROL STRUCTURES

13Hour

Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges.

UNIT – III FUNCTION

13 Hour

Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.

UNIT – IV OBJECTS

13 Hour

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, String Processing - Exception Handling

UNIT – V DICTIONARIES AND SETS

13 Hour

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.

Text Books

- Charles Dierbach (2015), “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition.
- Wesley J. Chun(2016), “Core Python Applications Programming”, 3rd Edition , Pearson Education.

Reference Books

- Mark Lutz(2018), “Learning Python Powerful Object Oriented Programming”, O’reilly Media, 5th Edition.
- Timothy A. Budd(2011), “Exploring Python”, Tata MCGraw Hill Education Private Limited,1st Edition.
- John Zelle(2013), “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, ISBN 978- 1590282410.
- Michel Dawson(2013), “Python Programming for Absolute Beginners” , Third Edition, Course Technology Cengage Learning Publications, , ISBN 978-1435455009

Course Outcomes:

CO	On completion of the course the student will be able to	BloomsLevel
CO 1	Define the essence of computational problem solving and Demonstrate proficiency in using Python programming language constructs such as literals, variables, and operators.	K1&K2
CO 2	Apply keyword arguments and default arguments in Python functions.	K3
CO 3	Analyze proper indentation in Python code.	K4
CO 4	Explain the use of Turtle Graphics in Python.	K5
CO 5	Develop basic programming skills using the Python programming language.	K6

DIGITAL MARKETING**UCSA 409****Semester : III****Credit : 2****Category : Generic(EC4)****Hour/Week: 2****Class&Major : II B.Com(CA)****Total Hour : 26****COURSE OBJECTIVES:**

CONo.	To enable the students
CO-1	Enumerate to recall the digital marketing concepts.
CO-2	Apply the concept of digital marketing in advertising.
CO-3	Compare the concepts of content and digital marketing to plan for websites.
CO-4	Evaluate the various web analytics level and types of publications.
CO-5	Develop to SEO writing, Google AdWords, CRM concepts.

UNIT – I INTRODUCTION TO DIGITAL MARKETING**6 Hours**

Introduction to Digital Marketing (DM)-Meaning, Definition, Need of DM, Scope of DM, History of DM, Concept and approaches to DM, Examples of good practices in DM. Email Marketing-Need for Emails, Types of Emails, options in Email advertising, Mobile Marketing-Overview of the B2B and B2C Mobile Marketing.

UNIT – II CONTENT MARKETING**5 Hours**

Business goals and planning for websites-Naming primary and lower level goals-CMS overview and concepts. Intro to Word Press -Word Press design, navigation and site structure.

UNIT – III SEARCH ANALYTICS**5 Hours**

SEO Optimization -Writing the SEO content - Google AdWords- creating accounts -

Google AdWords- types. Introduction to CRM - CRM platform - CRM models. Web design: - Optimization of Web sites - MS Expression Web

UNIT – IV WEB ANALYTICS

5 Hours

Introduction to Web analytics - Web analytics – levels. Introduction of Social Media

Marketing - Creating a Facebook page - Visual identity of a Facebook page - Facebook Ads - Creating FacebookAds - Types of publications

UNIT – V DIGITAL MARKETING IN ADVERTISING AND WORD PRESS

5 Hours

Levers of digital marketing- The digital advertising, a continuous disruption- The Personalization of Media- Data in Advertising- Predictive Models- Programmatic Advertising- website design guidelines- Domainregistration and hosting- WordPress website creation.

Text Books

- Ryan, D. (2014). “*Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation*”, Kogan Page Limited.
- Ryan Deiss (2015). “*The Beginner's Guide to Digital Marketing-Digital Marketer*”.
- Pulizzi,J. (2014).”*Epic Content Marketing*”, Mcgraw Hill Education.

Reference Books

- Ryan Deiss & Russ Henneberry(2017) , *Digital Marketing for Dummies*, ISBN: 9788126567010
- Eric Enge, Jessie Stricchiola, Stephan Spencer(2015). *The Art of SEO: Mastering Search Engine Optimization*
- Jerry Ramonyai,Digital Marketing & SEO(2022). “*Entrepreneur Power, Email, Data, Google Analytics, Search Engine Optimization, Website Content Writing, Online Business, Advertising Strategy & Growth*” Hacking.Kindle Edition.

e-Resources

- <https://www.pdfdrive.com/digital-marketing-how-internet-of-things-is-impacting-digitalmarket-e58837676.html>
- <https://www.webmarketingacademy.in/beginners-guide-to-digital-marketing-withresources/>
- <https://hsdm.in/digital-marketing>.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom’s Level
CO-1	Understand the basic of the digital marketing and its importance for marketing success.	K1,K2
CO-2	Apply the concepts of social media marketing.	K3
CO-3	Distinguish the different media and create marketing content using word press, CRM.	K4

CO-4	Compare the past and current tactics using Google analytics that will affect the future development of digital marketing.	K4
CO-5	Develop the Business using digital marketing in advertising using WordPress concept.	K5/K6

CO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	2	3
CO4	3	3	2	2	1	3
CO5	3	3	3	3	3	2

High Correlation - 70% Moderate Correlation – 26.67% Low Correlation - 3.33

WEB DESIGN USING MICROSOFT EXPRESSION WEB 4 –LAB

UCSR414

Semester : IV
 Category : Allied
 Class & Major : II B.Com(CA)

Credit : 1
 Hours/Week : 2
 Total Hours : 26

Course Objectives:

CO No.	To enable the students
CO-1	Understand the concepts of web page layout creation.
CO-2	Demonstrate the video encoding format to design a simple webpage.
CO-3	Apply the page element and HTML code for dynamic web pages.
CO-4	Examine the horizontal and vertical navigation using navigation controls.
CO-5	Develop the dynamic web template using MS Expression.

List of Exercises:

1. Create a Webpage Layout in Web Expression
2. Insert a Horizontal and Vertical Navigation in Web Expression
3. Develop a Dynamic Web Template in Web Expression
4. Develop Static Web Template in Web Expression
5. Create a Hyperlinks in Web Expression
6. Make use of Video, Audio in Web Expression
7. Evaluate Backup Website in Web Expression

8. Create the Add-Ins in Web Expression
9. Compose a Data Table in Web Expression
10. Build to Publish the website in Web Expression

e-Resource

- <https://www.informit.com/articles/article.aspx?p=1925941><https://www.expression-web-tutorials.com/ew4/creating-a-dwt.html>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Demonstrate the hyperlinks concepts.	K2
CO-2	Apply the backup website concepts to retrieve the data.	K3/K4
CO-3	Analyze to maintain the tables using data tables tools.	K4
CO-4	Design a simple webpage using MS expression web 4.	K6
CO-5	Develop a website using the navigation tools, page elements and video encoding format.	K5/K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 72 % Moderate Correlation -24% Low Correlation-4%

**SELF-STUDY PAPER
WEB APPLICATION DEVELOPMENT
UCSS301**

Semester	: III	Credit	1
Category	: SELF-STUDY PAPER	Hour/Week	2
Class &Major	: II B.sc Computer Science	Total Hour	26

COURSE OBJECTIVES:

Co No.	To Enable The Students
CO1	Understand the Web Services and implementation model for SOA
CO2	Analyze the SOA, its Principles and Benefits
CO3	Examine the XML concepts
CO4	Apply the paradigms needed for testing Web Services
CO5	Create the different Test Strategies for SOA-based applications

UNIT-1 INTRODUCTION**8 Hours**

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, MicroSoft DCOM Challenges in Distributed Computing, Introduction to Web Services – The definition of web services, basic operational model of web services, benefits and challenges of using web services.

UNIT-II ARCHITECTURE OF WEB SERVICE**9 Hours**

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services.

UNIT -III XML AND SOAP**9 Hours**

Brief Overview of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Service Oriented Architectures, , Service roles in a SOA, Reliable messaging.

Text Book

- Michael P (2012), “*Web Services & SOA Principles and Technology*”, Second Edition.

Reference book

- Frank P. Coyle, (2002) XML, “Web Services, and the Data Revolution”, Pearson Education.

e-Resources

- https://www.cs.uct.ac.za/mit_notes/web_programming.html
- https://mrcet.com/downloads/digital_notes/IT/WEB%20APPLICATION%20DEVELOPMENT.pdf

COURSE OUTCOMES:

CO	On completion of the course, the student will be able to	BloomsLevel
CO1	Understand the principles of SOA	K1,K2
CO2	Apply OOP principles to creation of web service solutions	K3
CO3	Select the appropriate framework components in creation of web service Solution	K4
CO4	Determine the market leading environment tools to create and consume web services	K5
CO5	Develop and implement UDDI Data Model	K6

CO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	3	2	2
CO2	2	3	3	2	3	2
CO3	2	3	3	3	2	3
CO4	2	3	2	2	3	3
CO5	3	3	3	3	3	2

High Correlation -60%**Moderate Correlation -40%****Low Correlation -NIL**

WEB APPLICATION DEVELOPMENT-PRACTICALS
UCSS302

Semester	:III	Credit	:1
Category	:SELF-STUDY PAPER	Hour/Week	:2
Class&Major	:II B.Sc Computer Science	TotalHour	:26

COURSE OBJECTIVES

Co.No	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Impart Practical Training in Control panel tools.
CO3	Familiarize with HTML Tags
CO4	Provide knowledge on working with events and methods
CO5	Build programs using Java script.

LIST OF PROGRAMS

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluate the expression and display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.

COURSE OUTCOMES:

CO.No	On the successful completion of the course, students will be able to	Bloom sLevel
CO1	Recall all the Basic tools in Webpage.	K1,K2
CO2	Apply various effects on webpage.	K3
CO3	Analyze the use of java script and html code.	K4
CO4	Estimate the user-defined functions and implement in Java script.	K5
CO5	Develop webpage using tools and techniques.	K6

CO-PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	2	3
CO4	3	3	2	2	1	3
CO5	3	3	2	3	3	2

High Correlation -66.67% Moderate Correlation -30% Low Correlation -3.33%

USER INTERFACE DESIGN**UCSS401**

Semester :IV

Credit :1

Category :SELF-STUDY PAPER

Hour/Week :2

Class&Major :II B.Sc Computer Science

TotalHour :26

COURSE OBJECTIVES:

Co.No	To enable the students
CO1	Understand the fundamental concepts of User Interface Design
CO2	Analyze the the knowledge of user- centered design, user -centered methods in design, graphic design on screens, and user centered design in corporate perspective
CO3	Determine the exposure to wire framing and Prototyping software in the various UI/UX Design tools
CO4	Enhance the user Interfaces to different devices
CO5	Build wire framing and Prototyping software in the various UI/UX Design tools

UNIT - I INTRODUCTION**8 Hours**

Overview, The importance of user interface – Defining the user interface, The importance

of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design.

UNIT - II THE USER INTERFACE DESIGN PROCESS

9 Hours

MAC Protocols: Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT - III SYSTEM MENUS AND NAVIGATION SCHEMES

9 Hours

Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus..

Text Books

- Wilbert O. Galitz,(2018). “*The Essential Guide to User Interface Design*”, John Wiley & Sons, Second Edition ,
- Creative Tim(2023).“*Roots of UI/UX Design*”,First Edition

References:

- Ben Sheiderman,(1998) .“*Design the User Interface*”, Pearson Education.
- Andrew Dillon(2002).*User Interface Design*,University of Texas at Austin,Second Edition.

COURSE OUTCOMES:

CO.No	On the successful completion of the course, students will be able to	Bloom’s Level
CO1	Define the concept of User Interface Design	K1,K2
CO2	Design the User menu creation, windows creation and connection between menus and windows.	K3
CO3	Examine web design methodologies like Responsive Web Design (RWD), and Progressive Web Development	K4
CO4	Develop applications and websites with web development frameworks, like Bootstrap.	K5
CO5	Comprehend the design, UI/UX concepts, best practices of visual development, and the key duties and responsibilities of a UI/UX designer.	K6

CO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	3	2	1
CO2	3	3	3	2	3	2
CO3	2	3	3	3	2	3
CO4	2	3	3	3	3	3
CO5	3	3	3	3	3	2

High Correlation -70%

Moderate Correlation –26.67%

Low Correlation -3.33

DEVOPS

UCSS402

Semester :IV
Category :SELF-STUDY PAPER
Class&Major :II B.Sc Computer Science

Credit :1
Hour/Week :2
Total Hour :26

COURSE OBJECTIVES:

CO.No.	To enable the students
CO-1	Introduce DevOps terminology, definition & concepts.
CO-2	Understand the different Version control tools like Git, Mercurial
CO-3	Understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment)
CO-4	Study about Configuration management using Ansible
CO-5	Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems

UNIT – I INTRODUCTION TO DEVOPS

9 Hours

Devops Essentials - Introduction to AWS, GCP, and Azure - Version control systems: Git and Github. COMPILE AND BUILD USING MAVEN & GRADLE: Introduction - Installation of Maven - Maven Build lifecycle - Build phases (compile build, test, and package) - Maven Profiles - Maven repositories (local, central, global) - Maven plugins - Installation of Gradle - Understand build using Gradle

UNIT – II CONFIGURATION MANAGEMENT USING ANSIBLE

9 Hours

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible

UNIT – III BUILDING DEVOPS PIPELINES USING AZURE

8 Hours

Create Github Account, Create Repository, and Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file

Text Books

- Roberto Vormittag (2016). “*A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises*”, Second Edition, Kindle Edition.
- Jason Cannon (2014). “*Linux for Beginners: An Introduction to the Linux Operating System and Command Line*”, Kindle Edition.

Reference Books

- MiteshSoni(2020), “*Hands-On Azure Devops: Cidc Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure*”, (English Edition) Paperback

- Jeff Geerling (2015.), “*Ansible for DevOps: Server and configuration management for humans*”, First Edition.
- David Johnson (2016.), “*Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps*”, Second Edition.
- Mariot Tsitoara (2019.), “*Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer*”, Second Edition.

e-Resource:

- <https://www.jenkins.io/user-handbook.pdf>.
- <https://maven.apache.org/guides/getting-started/>

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand different actions performed through Version control tools like Git.	K1,K2
CO-2	Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle	K3
CO-3	Ability to Perform Automated Continuous Deployment and configuration management using Ansible	K4
CO-4	Evaluate Cloud-based Devops tools using Azure Devops	K5
CO-5	Design Cloud-based Devops tools to compute the solutions	K6

CO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	2	2
CO2	3	3	3	2	1	2
CO3	3	3	3	3	2	3
CO4	3	3	2	2	3	3
CO5	3	3	3	3	3	2

High Correlation -70% Moderate Correlation -26.67% Low Correlation -3.33

III and IV Evaluation Components of CIA

Sem ester	Part	Category	Course Code	Course Title	ComponentIII	Componentt IV
III	III	Core V	UCSM308/UCAM308	Microprocessor Architecture	Assignment	Simple Program Writing
	III	Core VI	UCSR309/UCAR309	Microprocessor Architecture-Practical	DPA	Viva- Voce
	IV	Skill Enhancement (Sec-4)	UCSU301/UITU301/UCAU301	Graphics Design	Assignment	Seminar
IV	III	Core VII	UCSM410/UCAM408/UITM401	Industry Module:Java Application Prograaming	Assignment	Problem Solving
	III	Core VIII	UCSR413/UCAR409/UITR403	Java Application Prograaming-Practicals	DPA	Viva- Voce
	IV	Skill Enhancement (Sec-6)	UCSD401	Cloud Computing Services	Assignment	Seminar

ALLIED COURSES OFFERED TO OTHER DEPARTMENT

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	III	Allied	UCSA308	Business Analytics and Intelligence	Assignment	Seminar
III	III	Allied Practical	UCSR316	Business Analytics And Intelligence Lab	DPA	Viva-Voce
III	III	Allied	UCSA309	Programming Languages with Python	Assignment	Seminar
IV	III	Allied	UCSA409	Digital Marketing	Assignment	Seminar
IV	III	Allied Practical	UCSR414	Web Design using Microsoft Expression Web4 – Lab	DPA	Viva-Voce

MSc. (COMPUTER SCIENCE)

PREAMBLE

PG: Programme Profile and Syllabi of courses from III and IV semesters along with evaluation components of III and IV (with effect from 2023-2025 Batch onwards)

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon Completion of the M.sc Computer science Programme, the students would have
PSO 1	Understand the Advanced Computing technology and to develop Creative Applications and innovative solutions to the complex problems.
PSO 2	Develop strong Analytical Skills, Critical thinking and Experimental Skills in various Programming Languages and to conduct independent research and apply advanced research methodologies to investigate and solve complex problems in computer science
PSO 3	Create Professional Development in the fields of IT to develop effective software solutions needed for the government organizations and industrial areas.
PSO 4	Design and develop advanced software systems, technology skills, and application tools using cutting-edge technologies and programming languages
PSO 5	Apply analytical thinking, programming approaches, and contextual knowledge to address changing societal and technological challenges, while assessing and fulfilling responsibilities relevant to computer science problems.
PSO 6	Investigate Research Gaps, Analyze and Carry out Research in the Specialized/Emerging trends of Computing Technologies and engage in lifelong learning in the field of Computer Science.

PROGRAMME PROFILE: M.Sc Computer Science

Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit Min/Max
I	Core Courses - I	PCSM120	Design and Analysis of Algorithms	5	4
	Core Courses - II	PCSM121	Advanced Python Programming	5	4
	Core Courses - III	PCSR109	Algorithms and Python Programming – Practical	5	4
	Elective (Generic / Discipline)	PCSO101	Network Protocols	5	3

	Centric)-I				
	Elective (Generic / Discipline Centric)-II	PCSR110	Network Protocols Lab	5	3
	Skill Enhancement Course SEC 1 – (NME)			3	2
	Skill Enhancement Online Course		Online Course	2	2
Total				30	22
II	Core Courses – IV	PCSM218	Theory of Computation	5	4
	Core Courses – V	PCSM219	Big Data Analytics tools and technologies	5	4
	Core Courses – VI	PCSR210	Big Data Analytics tools and technologies - Practical	5	4
	Core Industry Module-I	PCSM220	Software Testing	4	3
	Elective (Generic / Discipline Centric)-III	PCSO201	Embedded system in Internet of Things	4	3
	Elective (Generic / Discipline Centric)-IV	PCSR211	Embedded system in Internet of Things - Practical	4	3
	Skill Enhancement Course SEC 1 –(Discipline)	PCSD201	Mobile Computing	3	2
	Service Learning (IV)	PALE201		-	1
Internship/Field visit(IV)	PINS201		-	2	
Total				30	26
III	Core Courses – VII	PCSM318	Artificial Intelligence & Machine learning	5	4
	Core Courses – VIII	PCSM319	Network Security and Cryptography	5	4
	Core Courses – IX	PCSM320	Natural Language Processing	5	4
	Core Industry Module - II	PCSR309	Advanced Artificial Intelligence & Machine Learning Lab	4	3

	Elective (Generic / Discipline Centric)-V	PCSO301	Blockchain Technologies	4	3
	Elective (Generic / Discipline Centric)-VI	PCSR321	Blockchain Technologies - Practical	3	3
	Skill Enhancement Course SEC 3(Interdisciplinary)	PCSI302	Research Methodology	4	2
Total				30	23
IV	Core Courses – X	PCSM409	Digital Image Processing	5	4
	Core Courses – XI	PCSM410	Data Science & Analytics	5	4
	Core Courses – XII	PCSR401	Digital Image Processing -Lab	5	4
	Project with Viva- Voce	PCSP403	Project and Viva-Voce	6	4
	Elective-Discipline Specific	PCSO401	Augmented and Virtual Reality	5	3
	Skill Enhancement Course - Professional Competency Skill	PCSC401	Professional Competency	4	2
	Internship/Field visit(IV)	PINS401	Internship		-/2
Total				30	21/23
Grand Total				120	92/94

ARTIFICIAL INTELLIGENCE& MACHINE LEARNING

PCSM318

Semester	: III	Credit	4
Category	: Core Courses – VII	Hour/Week:	5
Class & Major	: II M.Sc Computer Science	Total Hour:	65

Course Objectives:

CO No.	To enable the students
CO-1	Learn the basic functions of AI, Heuristic Search Techniques.
CO-2	Provide knowledge on concepts of Representations and Mappings and Predicate Logic.
CO-3	Introduce Machine Learning with respect to Data Mining, Big Data and Cloud computing
CO-4	Evaluate techniques for Applications & Impact of ML
CO-5	Implement Learning Techniques

UNIT- I PROBLEM SOLVING

12 Hour

Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP)

UNIT- II PROBABILISTIC REASONING

12 Hour

Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

UNIT- III SUPERVISED LEARNING

15 Hour

Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests

UNIT- IV ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING 12 Hour

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization

UNIT- V NEURAL NETWORKS

14 Hour

Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error backpropagation, from shallow networks to deep networks –Unit saturation (aka the vanishing gradient problem) – ReLU, hyperparameter tuning, batch normalization, regularization, dropout.

Case Study : ChatGPT, Generative AI

Text Books

- Stuart Russell and Peter Norvig (2021.), “*Artificial Intelligence – A Modern Approach*”, Fourth Edition, Pearson Education.
- Ethem Alpaydin (2020), “*Introduction to Machine Learning*”, MIT Press, Fourth Edition.

Reference Books

- Judith Hurwitz, Daniel Kirsch(2017), “*Machine Learning for Dummies®*”, IBM Limited Edition
- Elaine Richand Kevin Knight (2000), “*Artificial Intelligence*”, Tata McGraw Hill Publishers company Pvt Ltd, Second Edition.
- George FLuger (2002), “*Artificial Intelligence*”, 4th Edition, Pearson Education Publ.

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Understand the concepts of AI problems and techniques.	K1,K2
CO-2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	K3
CO-3	Analyze the dynamic behavior of a system	K4
CO-4	Evaluate the impact of machine learning on applications in development of emerging Technologies	K5
CO-5	Create machine learning applications to solve the real world problems	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

NETWORK SECURITY AND CRYPTOGRAPHY

PCSM319

Semester : III

Credit :4

Category : Core Courses – VIII

Hour/Week: 5

Class & Major: II M.Sc Computer Science

Total Hour: 65

Course Objectives:

CO No.	To enable the students
CO-1	Acquire Knowledge about Cryptography, Web Security and Case studies in Cryptography.
CO-2	Define classical encryption techniques and concepts of modular arithmetic and number theory.
CO-3	Understand the vulnerabilities and strengths of different hashing algorithms and how they protect against collisions and attacks.
CO-4	Develop skills to use elliptic curve algorithms for encryption, decryption, and key exchange.
CO-5	Create the Cryptographic algorithms to evolve the security

UNIT – I INTRODUCTION

12 Hour

Introduction to Cryptography – Security Attacks – Security Services –Security Algorithm- Stream cipher and Block cipher - Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5

UNIT – II CRYPTOSYSTEM

13 Hour

Public-key Cryptosystem: Introduction to Number Theory- RSA Algorithm–Key Management-

Diffie -Hellman Key exchange– Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

UNIT – III NETWORK SECURITY

13 Hour

Network Security Practice: Authentication Applications–Kerberos–X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

UNIT – IV WEB SECURITY

12Hour

Web Security-Secure Socket Layer–Secure Electronic Transaction. System Security-Intruders and Viruses – Firewalls – Password Security.

UNIT – V MOBILE DATA NETWORKS

15 Hour

4G Networks and Composite Radio Environment – Protocol Boosters – Hybrid 4G Wireless Networks Protocols – Green Wireless Networks – Physical Layer and Multiple Access – Channel Modelling for 4G – Concepts of 5G – channel access –air interface -Cognitive Radiospectrum management – C-RAN architecture - Vehicular communications-protocol – Network slicing – MIMO, mmWave, Introduction to 6G.

Case Study: Implementation of Cryptographic Algorithms– RSA– DSA– ECC(C/JAVA Programming).

Text Books

- William Stallings (2020), “*Cryptography and Network Security*”, PHI/ Pearson Education.
- Erik Dahlman, Stefan Parkvall, Johan Skold (2019), “*4G: LTE/LTE-Advanced for Mobile Broadband*”, Academic Press.

Reference Books

- A.Menezes, P Van Oorschot and S.Vanstone (2018), “*Hand Book of Applied Cryptography*”, CRC Press.
- AnkitFadia (2019), ”*Network Security*”, MacMillan.

e-Resource:

- <https://nptel.ac.in/courses/106/105/106105031/>
- <http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html>
- <https://www.tutorialspoint.com/cryptography/index.htm>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the process of the cryptographic algorithms	K1,K2
CO-2	Apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	K3
CO-3	Analyze appropriate security techniques to solve network security problem	K4
CO-4	Explore suitable cryptographic algorithms for web and network security	K5
CO-5	Develop different digital signature algorithms to achieve authentication and design secure applications	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%**Moderate Correlation – 40%****Low Correlation – 10%****NATURAL LANGUAGE PROCESSING****PCSM320****Semester : III****Credit : 4****Category : Core Courses – IX****Hour/Week: 5****Class & Major : II M.Sc Computer Science****Total Hour: 65****Course Objectives:**

CO No.	To enable the students
CO-1	Understand the NLP techniques.
CO-2	Familiarized with the data structures and algorithms used in NLP.

CO-3	Understand and process raw text and apply categorizing tagging words for classification.
CO-4	Explore the design issues and working principles of various authentication Applications and various secure communication standards including Kerberos, IPsec, and SSL/TLS and email
CO-5	Learn the basics of first order logic and propositional logic

UNIT - I LANGUAGE PROCESSING AND PYTHON

15 Hour

Computing with Language: Texts and Words - A Closer Look at Python: Texts as Lists of Words -Computing with Language: Simple Statistics - Back to Python: Making Decisions and Taking Control -Automatic Natural Language Understanding- Accessing Text Corpora and Lexical Resources: Accessing Text Corpora- Conditional Frequency Distributions -More Python: Reusing Code - Lexical Resources –Word Net

UNIT – II PROCESSING RAW TEXT

15 Hour

Accessing Text from the Web and from Disk - Strings: Text Processing at the Lowest Level- Text Processing with Unicode- Regular Expressions for Detecting Word Patterns- Useful Applications of Regular Expressions - Normalizing Text - Regular Expressions for Tokenizing Text - Segmentation –Formatting: From Lists to Strings - Writing Structured Programs : Back to the Basics- Sequences- Questions of Style - Functions: The Foundation of Structured Programming - Doing More with Functions- Program Development- Algorithm Design-A Sample of Python Libraries.

UNIT – III CATEGORIZING AND TAGGING WORDS

12 Hour

Using a Tagger-Tagged Corpora- Mapping Words to Properties Using Python Dictionaries- Automatic Tagging- N-Gram Tagging-Transformation-Based Tagging- How to Determine the Category of a Word- Learning to Classify Text: Supervised Classification-Further Examples of Supervised Classification-Evaluation-Decision Trees-Naive Bayes Classifiers- Maximum Entropy Classifiers-Modeling Linguistic Patterns.

UNIT – IV EXTRACTING INFORMATION FROM TEXT

12 Hour

Information Extraction- Chunking-Developing and Evaluating Chunkers- Recursion in Linguistic Structure- Named Entity Recognition - Relation Extraction- Analyzing Sentence Structure: Some Grammatical Dilemmas-What’s the Use of Syntax? -Context-Free Grammar- Parsing with Context-Free Grammar-Dependencies and Dependency Grammar- Grammar Development.

UNIT - V BUILDING FEATURE-BASED GRAMMARS

11 Hour

Grammatical Features-Processing Feature Structures-Extending a Feature-Based Grammar-Analyzing the Meaning of Sentences: Natural Language Understanding- Propositional Logic- First-Order Logic- The Semantics of English Sentences- Discourse Semantics.

Text Books

- Steven Bird, Ewan Klein and Edward Loper (2019), “*Natural Language Processing with Python*”, O_Reilly Media.
- Daniel Jurafsky, James H. Martin,(2020) “*Speech and Language Processing: An Introduction to Natural Language Processing*”, Computational Linguistics and Speech, Pearson Publication.

Reference Books

- Daniel Jurafsky and James H Martin (2018), "*Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*", Prentice Hall, 2nd Edition.
- Akshar Bharati, Vineet Chaitanya, Rajeev Sangal (2014), “*Natural Language Processing – A Paninian Prespective*”, Prentice Hall of India.
- Clark, A., Fox, C., & Lappin, S. (Eds.). (2012). The handbook of computational linguistics and natural language processing (Vol. 118). John Wiley & Sons.
- Bender, E. M., & Lascarides, A. (2019). Linguistic fundamentals for natural language processing ii: 100 essentials from semantics and pragmatics. *Synthesis Lectures on Human Language Technologies*, 12(3), 1-268.
- Hapke, H. M., Lane, H., & Howard, C. (2019). Natural language processing in action.
- Indurkha, N., & Damerau, F. J. (2010). Handbook of natural language processing. Chapman and Hall/CRC.
- James Allen (2015.), “*Natural Language Understanding*”, Pearson Education, 3rd ed,

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the key concepts of NLP and linguistics which is used to describe and analyze language.	K1,K2
CO-2	Apply data structures and algorithms concepts in NLP.	K3
CO-3	Analyze data stored in standard formats in NLP to process the algorithms.	K4

CO-4	Evaluate the methods and algorithms used to process different types of textual data.	K5
CO-5	Develop extract grammatical features and to implement first order logic and propositional logic.	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

ADVANCED ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LAB PCSR309

Semester : III

Credit : 3

Core : Core Industry Module - II

Hour/Week : 4

Class & Major: II M.Sc Computer Science

Total Hour : 52

Course Objectives:

CO No.	To enable the students
CO -1	Understand the components and structure of cyber security.
CO -2	Acquire knowledge how to work with various Linux commands
CO -3	Learn the basic and important design concepts and issues of cyber security
CO -4	Protect and defend computer systems and networks
CO -5	Monitor cyber security mechanisms to help and ensure the protection of information technology assets.

LAB EXERCISES:

1. Implementation of Uninformed search algorithms (BFS, DFS)
2. Implementation of Informed search algorithms (A*, memory-bounded A*)

3. Implement naïve Bayes models
4. Implement Bayesian Networks
5. Build Regression models
6. Build decision trees and random forests
7. Build SVM models
8. Implement ensembling techniques
9. Implement clustering algorithms
10. Implement EM for Bayesian networks
11. Build simple NN models
12. Build deep learning NN models

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Illustrate the cyber security needs of an organization.	K1,K2
CO-2	Apply reasoning under uncertainty to enhance the Computations	K3
CO-3	Classify security issues in networks and computer systems to secure an IT infrastructure.	K4
CO-4	Build ensembling and unsupervised models	K5
CO-5	Design software to implement the various algorithms to enhance the results.	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

BLOCKCHAIN TECHNOLOGIES

PCSO301

Semester : III

Credit :3

Category : Elective - Discipline Centric-V

Hour/Week: 4

Class & Major : II M.Sc Computer Science

Total Hour: 52

Course Objectives:

CO No.	To enable the students
CO-1	Understand the fundamentals of blockchain and cryptocurrency
CO-2	Define the influence and role of block chain in various other fields.
CO-3	Learn security features and its significance.
CO-4	Identify problems & challenges posed by BlockChain.
CO-5	Familiarity in available opportunities and challenges in Block Chain.

UNIT – I INTRODUCTION

12 Hour

Introduction to Blockchain - The big picture of the industry – size, growth, structure, players. Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT). Strategic analysis of the space – Blockchain platforms, regulators, application providers. The major application: currency, identity, chain of custody.

UNIT – II BLOCKCHAIN NETWORK AND SECURITY ISSUES

8 Hour

Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Blockchain 1.0, 2.0 and 3.0 – transition, advancements and features. Privacy, Security issues in Blockchain.

UNIT - III CRYPTOCURRENCY

9 Hour

Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures -High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary. Application of Cryptography to Blockchain

UNIT – IV MULTICHAIN

11 Hour

Multichain - Compatibility & Differences with Bitcoin Core - Working with Multichain Streams - Multichain Explorer - Checking PoE in using Multichain.

UNIT – V HYPERLEDGER FABRIC

12 Hour

Hyperledger Fabric - Comparison between Fabric & Other Technologies - Fabric Architecture - Components - Advantages - Goals of Hyperledger - Hyperledger Fabric Network Setup.

Case Study: Blockchain Applications Blockchain in Healthcare ,Blockchain in Energy

Text Books

- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder (2016), “*Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*”, Princeton University Press.
- Antonopoulos (2014), “*Mastering Bitcoin:Unlocking Digital Cryptocurrencies*”.
- Melanie Swan (2015), “*Blockchain*”, O’Reilly media, February.

Reference Books

- Satoshi Nakamoto(2008),“*Bitcoin:APeer-to-Peer Electronic Cash System*”
- Rodrigoda Rosa Righi, Antonio Marcos Alberti, Madhusudan Singh (2020),“*Blockchain Technology for Industry 4.0*” Springer.

e-Resource

- <https://www.javatpoint.com/blockchain-tutorial>
- <https://www.tutorialspoint.com/blockchain/index.htm>
- <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Understand and Demonstrate blockchain technology, crypto currency and mining mechanism in blockchain	K1,K2
CO-2	Apply security measures, and various types of services that allow people to trade and transact with bitcoins	K3
CO-3	Analyze how the Blockchain plays a role in healthcare industry	K4
CO-4	Determine the security, privacy, and efficiency of a given Blockchain system	K5
CO-5	Design Blockchain Application to secure the trade and transactions	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

BLOCKCHAIN TECHNOLOGIES –PRACTICAL

PCSR321

Semester : III

Credit : 3

Core : Elective - Discipline Centric -VI

Hour/Week : 3

Class & Major: II M.Sc Computer Science

Total Hour : 39

Course Objectives:

CO No.	To enable the students
CO-1	Learn the basics of Blockchain and apply cryptographic algorithms
CO-2	Design, build, and deploy smart contracts and distributed applications,
CO-3	Deploy Private Blockchain and smart contracts on Ethereum.
CO-4	Understand and deploy crypto currencies and their functions in applications
CO-5	Implement Blockchain for various use cases.

LAB EXERCISES:

1. Create simple Program for Value or Data Types
2. Create simple Program for Strings & Operators
3. Create simple Program for Arrays
4. Create simple Program for Data Structures
5. Write Hello World smart contract in a higher programming language (Solidity)
6. Construct the Naïve block chain
7. Construct and deploy your contract (Use deploy method)

8. Hashcash implementation
9. Develop a toy application using Blockchain
10. Create simple wallet transaction from one account to another account using Metamask.

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Acquire knowledge about creation of own private Blockchain and deploy smart contracts on Ethereum.	K1,K2
CO-2	Apply cryptography and Consensus algorithms to develop a blockchain.	K3
CO-3	Deploy the structure and mechanism of Bitcoin, Ethereum, Hyper ledger to transact cryptocurrency	K4
CO-4	Evaluate the mechanism to create multichain and blockchain	K5
CO-5	Create Blockchain application for various use cases	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

RESEARCH METHODOLOGY

PCSI302

Semester	: III	Credit	: 2
Category	: Skill Enhancement Course - Interdisciplinary	Hour/Week	: 4
Class & Major	: II M.SC Computer Science	Total Hour	52

Course Objectives:

CO No.	To enable the students
CO -1	Understand the concepts of Research and its types
CO -2	Discuss Problem formulation, analysis and solutions
CO -3	Analyze data collection tools and packages.
CO -4	Technical paper writing / presentation without violating professional ethics
CO -5	Inculcate techniques for research and uses of tools

UNIT-I INTRODUCTION TO RESEARCH METHODOLOGY

10 Hour

Meaning of research; objective of research; motivation in research; types of research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical- research approaches; significance of research, research methods versus methodology; Research and scientific methods; Importance of knowing how research is done; Research process; Criteria for good research.

UNIT-II RESEARCH PROBLEM AND RESEARCH DESIGN

10 Hour

Research problem: Selecting research problem; necessity of defining a problem; techniques of defining problem; formulation of research problem, objectives of research problem. Meaning of research design; need for research design; important concept related to research design; different research designs; basic principles of experimental design; important experimental design.

UNIT-III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS

10 Hour

Census and sample surveys, Characteristics of good sample design Different types of sample designs, Techniques of selecting a random sample-Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.), hypothesis testing.

UNIT-IV INTERPRETATION, REPORT WRITING, RESEARCH ETHICS AND IPR

11 Hour

Interpretation and report writing; Meaning of interpretation; techniques of interpretation; precautions in interpretation; significance of report writing, layout of research report, types of reports; Presentation of research work-oral, poster and writing research paper; Precautions for writing research report, conclusion. Ethics-ethical issues, related to research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the patent system – Basic, principles and general requirements of patent law.

UNIT-V TOOLS FOR ANALYSIS

11 Hour

Interpretation of data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

Text Books

- Kothari, C. R. (2020). “*Research Methodology: Research and techniques*”, New Delhi:New Age International Publishers.
- Carlos, C.M. (2015), “*Intellectual property rights. The WTO and developing countries: the TRIPS agreement and policy options*”, Zed Books. New York.
- Beier F.K, Crespi R.S and Straus T(1999), “*Biotechnology and Patent protection*” Oxfordand IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery(2009), “*SPSS for Windows*”, Pearson Education.

Reference Books

- Singh, Y. K. (2006), “*Fundamental of Research Methodology and Statistics*” New Delhi. New International (P) Limited. Publishers.
- Wallinman,N. (2006)., “*Your Research Project: A step-by-step guide for the first- time researcher*”. London: Sage Publications.
- Wilkison , T.S. & Bhandarkar . P.L.,(2000), “*Methodology and Techniques of Social Research*”. Mumbai. Himalaya Publishing House.
- Leslie Lamport(1994), “*LaTeX: A Document Preparation System*”, Second Edition.

e-Resources

- [http:// www.ptt.ed/-super7/430114401/4391.ptt/](http://www.ptt.ed/-super7/430114401/4391.ptt/).
- <https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf>
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand research and its goals, Critical thinking, Techniques for generating research topics	K1
CO-2	Apply different research design to create research Module.	K2
CO-3	Analyze different methods of data collection for the development of research studies	K3,K4
CO-4	Determine the interpretation and report writing.	K5
CO-5	Create techniques for research to do the successful completion of research work	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3 Create	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation

– 10%

DIGITAL IMAGE PROCESSING

PCSM409

Semester : IV
Category : Core Courses – X
Class & Major : II M.Sc Computer Science

Credit :4
Hour/Week: 5
Total Hour: 65

Course Objectives:

CO No.	To enable the students
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CO-1	Learn basic image processing techniques for solving real problems.
CO-2	Gain knowledge in image transformation and Image enhancement techniques.
CO-3	Understand the Image Restoration process to remove the noisy data in the image
CO-4	Learn Image compression and Segmentation procedures.
CO-5	Create a enhanced image using the image processing techniques

UNIT - I INTRODUCTION

14 Hour

Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.

UNIT- II IMAGE ENHANCEMENT

13 Hour

Image Enhancement in the spatial domain:- Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.

UNIT- III IMAGE RESTORATION

15 Hour

Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.

UNIT - IV INTRODUCTION TO OPENCV

11 Hour

An Introduction to OpenCV – Structure of OpenCV- Reading and Writing Image and Video Files. Image Processing Tools: BasicData Types-Pixel-Level Access-Common Operations with Images Arithmetic Operations-Histograms. Correcting and Enhancing Images: Image Filtering –Smoothing, Sharpening, Working with Image Pyramids. Morphological Operations - Geometric Transformation.

UNIT - V IMAGE PROCESSING IN OPENCV

12 Hour

Processing Color:-Color Spaces- Conversion between Color Spaces (cvt Color) RGB,

Grayscale, YCrCb and HSV. Image Processing for Video: Video stabilization- Super resolution. Computational Photography: High-dynamic-range images-Creating HDR images - Tone mapping - Seamless cloning-Decolorization. CASE Study: Exploring Structure from Motion Using OpenCV - Number Plate Recognition Using SVM and Neural Networks- Face Recognition using Eigen Faces or Fisher Faces.

Text Books

- Rafael C.Gonzalez, Richard E.Woods,(2021) “*Digital Image Processing*”, Second Edition, PHI/Pearson Education.
- B.Chanda, D.Dutta Majumder (2020), “*Digital Image Processing and Analysis*”, PHI.

Reference Book

- Nick Efford (2014), “*Digital Image Processing a practical introducing using Java*”, Pearson Education.
- Rafael, C. Gonzalez. Richard, E. Woods. (2017). “*Digital Image Processing*”. (4thEd). Pearson/Prentice Hall.
- Gloria Bueno Garcia. Oscar Deniz Suarez. (2015). “*Learning Image Processing with OpenCV*”. Packet Publishing Ltd. (1st Ed)

e-Resource

- <https://nptel.ac.in/courses/117/105/117105135/>
- <https://www.tutorialspoint.com/dip/index.htm>
- <https://www.javatpoint.com/digital-image-processing-tutorial>

Course Outcomes:

CO No.	On completion of the course ,the student will be able to	Bloom’s Level
CO-1	Understand the fundamentals of Digital Image Processing and identify mathematical foundations for digital image representation, etc., and also learn about the openCV	K1,K2
CO-2	Apply the concepts of filtering and segmentation for digital image retrieval	K3
CO-3	Analyze the various processing techniques to get solutions for digital image processing problems	K4
CO-4	Examine concepts of Multi-resolution process and recognize the objects in an efficient manner	K5
CO-5	Create a pre – processed images to get the high resolution digital images for the medical industry	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

DATA SCIENCE AND ANALYTICS

PCSM410

Semester : I

Credit :4

Category : Core Courses – XI

Hour/Week : 5

Class & Major : II M.Sc Computer Science

Total Hour : 65

Course Objectives:

CO No.	To enable the students
CO-1	Gain knowledge about data science, big data & its ecosystem.
CO-2	Learn data analytics & its life cycle.
CO-3	Explore the programming language R, with respect to the data mining algorithms.
CO-4	Relate the relationship between artificial intelligence, machine learning and data science.
CO-5	Familiarity with data Science analytics tools for the betterment of computation

UNIT - I INTRODUCTION

13 Hour

Introduction of Data Science: data science and big data – facets of data-data science process- Ecosystem- the Data Science process – six steps- Machine Learning.

UNIT - II BASICS OF DATA ANALYTICS

11 Hour

Data Analytics lifecycle – review of data analytics – Advanced data Analytics – technology and tools.

UNIT - III DATA ANALYTICS USING R

15 Hour

Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types –Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation.

UNIT - IV CLUSTERING

15 Hour

Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K-means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes’ Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.

UNIT - V PREDICTIVE ANALYTICS

11 Hour

Linear least squares – implementation – goodness of fit – testing a linear model – weighted resampling. Regression using StatsModels – multiple regression – nonlinear relationships – logistic regression – estimating parameters – Time series analysis – moving averages – missing values – serial correlation – autocorrelation. Introduction to survival analysis.

Text Books

- John Wiley & Sons (2020), “*Introducing- Data-Science -Big-Data-Machine-Learning- and-more-using-Python-tools*”.
- Bikram P. Sinha (2015), “*Data science in bigdata analytics*”, Wiley publication.

Reference Books

- Lars Nielson(2019) , “*A simple introduction to Data Science*”.
- Davy Cielen, Arno D.B.Meysman, Mohamed Ali (2018), “*Introducing Data Science*” Manning Publication.
- Roger D.Peng (2017), “*R Programming for Data Science*”, Lean Publication.
- David Cielen, Arno D. B. Meysman, and Mohamed Ali (2016), “*Introducing Data Science*”, Manning Publications.
- Robert S. Witte and John S. Witte (2017.), “*Statistics*”, Eleventh Edition, Wiley Publications.
- Jake VanderPlas (2016.), “*Python Data Science Handbook*”, O’Reilly.

e-Resource

- https://www.tutorialspoint.com/python_data_science/index.htm
- <https://www.javatpoint.com/data-science>
- <https://nptel.ac.in/courses/106/106/106106179/>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the concept of data science and its techniques	K1,K2
CO-2	Apply and determine appropriate data Mining techniques using R to Real time applications	K3
CO-3	Analyze on clustering algorithms and regression methods in AI	K4
CO-4	Evaluate the Analytic tools to explore the Data Mining techniques.	K5
CO-5	Create a algorithm to incorporate the ML and AI in Data science	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%**Moderate Correlation – 40%****Low Correlation – 10%****DIGITAL IMAGE PROCESSING LAB****PCSR401****Semester : IV****Credit :4****Category : Core Courses – XII****Hour/Week:****Class & Major : II M.Sc Computer Science****Total Hour: 65****Course Objectives:**

CO No.	To enable the students
CO-1	Learn basic image conversion techniques for solving real problems.

CO-2	Gain knowledge in image transformation and Image enhancement techniques.
CO-3	Understand the Image filtering techniques for pre - processing
CO-4	Learn Image Segmentation procedures to develop a quality digital image.
CO-5	Implement enhanced image using the image processing techniques

1. Convert Gray Scale image to Binary Image.
2. Finding Negative of an Image.
3. Histogram Equalization.
4. Arithmetic Operators using Image.
5. Gaussian Low pass Filter.
6. Gaussian High pass Filter.
7. Homomorphic Filtering.
8. Edge Detection.
9. Erosion of an Image.
10. Dilation of an Image.
11. Conversion between color spaces.
12. Segmentation using watershed transform .

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand the basic image conversion and processing techniques for digital image	K1,K2
CO-2	Apply various image transformation and Image enhancement techniques to enhance the medical images.	K3
CO-3	Analyze the Image filtering techniques for pre - processing the colored or gray scale image	K4

CO-4	Categories Segmentation procedures to develop a quality digital image to get the appropriate results.	K5
CO-5	Develop enhanced image using the image processing techniques to get the better enhance digital images.	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

AUGMENTED AND VIRTUAL REALITY

PCSO401

Semester : IV

Credit 3

Category : Elective-Discipline Specific

Hour/Week 5

Class & Major : II M.SC Computer Science

Total Hour 65

Course Objectives:

CO No.	To enable the students
CO -1	Understand virtual reality, augmented reality and using them to build Biomedical applications
CO -2	Interpret virtual reality, augmented reality and using them to build Biomedical engineering applications
CO -3	Analyze and understand the working of various state of the art AR devices.
CO -4	Develop PDA applications with better optimality.
CO -5	Demonstrate case studies and applications with a futuristic vision along with socio-economic impact and issues.

UNIT-I INTRODUCTION TO VIRTUAL REALITY

13 Hour

Virtual Reality & Virtual Environment: Computer Graphics- Real-time computer graphics-Flight simulation-Virtual environments-Requirements for VR- benefits of Virtual reality. **The historical development of VR:** Scientific landmarks **Virtual Reality Applications:** Science, Medical, Education.

UNIT-II HARDWARE TECHNOLOGIES FOR 3D USER INTERFACES

13 Hour

3D User Interface Output Hardware: Visual Displays – Auditory Displays – Haptic Displays. **Design Guidelines:** Choosing Output Devices for 3D User Interfaces. **3D User Interface Input Hardware:** Input device characteristics- Desktop input devices – Tracking Devices- 3D Mice – Special Purpose Input Devices – Direct Human Input Devices

UNIT-III 3D INTERACTION TECHNIQUES

13 Hour

Selection and Manipulation: 3D Manipulation tasks – Manipulation Techniques and Input Devices – Interaction Techniques for 3D Manipulation – Design Guidelines. **Travel:** 3D Travel Tasks – Travel Techniques – Design Guidelines. **System Control:** Classification – Graphical Menus – Voice Commands – Gestural Commands – Tools – Multimodal System Control Techniques.

UNIT-IV AR TECHNIQUES- MARKER BASED & MARKERLESS TRACKING

13 Hour

Marker-based approach: Introduction to marker-based tracking – types of markers – marker camera pose and identification – visual tracking. **Marker types:** Template markers – 2D barcode markers – imperceptible markers. **Marker-less approach:** Localization based augmentation – real world examples. **Tracking methods:** Visual tracking – feature based tracking – hybrid tracking – initialization and recovery.

UNIT-V AR – MIXED REALITY

13 Hour

Augmented and Mixed Reality: Taxonomy – technology and features of augmented reality- difference between AR and VR – Challenges with AR – AR systems and functionality – Augmented reality methods – visualization techniques for augmented reality. **Augmented Reality Software:** Introduction, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application.

Case Study: Design real-time models in vrmf such as car, house, globe, 3d helix, etc., to submit it for Component III.

Text Books

- Alan B Craig, William R Sherman and Jeffrey D Will,(2019). “*Developing Virtual Reality*

Applications: Foundations of Effective Design”, Morgan Kaufmann, (Unit-5: Chapter-4,5,6)

- Gerard Jounghyun Kim,(2015). “*Designing Virtual Systems: The Structured Approach*”.
- Doug A Bowman, Ernest Kujiff, Joseph J LaViola, Jr and Ivan Poupyrev,(2005). “*3D User Interfaces, Theory and Practice*, Addison Wesley, USA, (Unit-2: Chapter-3,4 ; Unit-3: Chapter-5,6,7,8 ; Unit-4: Chapter-10)”.

Reference Books:

- Kharis O’Connell .(2016).”*Designing for Mixed Reality*”, Published by O’Reilly Media, Inc., ISBN: 9781491962381
- Sanni Siltanen, “*Theory and applications of marker-based augmented reality*”, Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
- John Vince, (1995), “*Virtual Reality Systems*”, Addison Wesley.
- Howard Rheingold,(1991), “*Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society*”, Simon and Schuster.
- William R Sherman and Alan B Craig,(2002), “*Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics*”. Morgan Kaufmann Publishers, San Francisco, CA.
- Alan B. Craig,(2013), “*Understanding Augmented Reality, Concepts and Applications*”, Morgan Kaufmann.

e-Resource:

- <http://lavallo.pl/vr/book.html>
- <https://www.vtresearch.com/sites/default/files/pdf/science/2012/S3.pdf>
- <https://docs.microsoft.com/en-us/windows/mixed-reality/>

MOOC Courses:

- <https://www.coursera.org/learn/ar>
- <https://www.udemy.com/share/101Xpi/>
- <https://nptel.ac.in/courses/106/106/106106138/>
- <https://www.coursera.org/learn/introduction-virtual-reality>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Understand a system or process to meet given specifications with realistic constraints.	K1,K2
CO-2	Apply problem statements and function as a member of design team.	K3

CO-3	Analyze technical resources to develop a AR - Computations	K4
CO-4	Summarize technical documents and technical oral presentations related to design mini project results	K5
CO-5	Formulate virtual reality, augmented reality and using them to build Biomedical engineering applications	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

PROFESSIONAL COMPETENCY PCSC401

Semester : IV

Credit 3

Category : Skill Enhancement Course

Hour/Week 4

Class & Major : II M.SC Computer Science

Total Hour 52

Course Objectives:

CO No.	To enable the students
CO -1	Understand teaching aptitude, mathematical reasoning
CO -2	Learn Data interpretation and research aptitude
CO -3	Understand the various components of full stack development
CO -4	Learn Node.js features and applications
CO -5	Develop applications with MongoDB

UNIT I WEB DESIGNING

10 Hour

How to create simple web pages using HTML 5- Create Styles of web pages using CSS- Create own account in cloud and launch and track no. of visitors- Host in Amazon web server- Embedded database with different web pages using Mongo DB- Design and develop dynamic websites with PHP- Make websites, web servers, game frameworks, desktop and CLI (Command Language Interpreter) applications, and IDE using Python.

UNIT-II WEB DEVELOPMENT

10 Hour

Create an interactive website using any of the mentioned development language- Integrate application with database. Create multimedia applications by using authoring tools- Gain familiarity with a very convenient, flexible server-side language: PHP along with front end scripting language HTML 5 and CSS.- Get exposed to programming concepts of JAVA.- Use of HTML and CSS for structuring and styling of the webpage. enhance their build website by storing and using customer data to generate dynamic page content using PHP.

UNIT III BASICS OF FULL STACK

11 Hour

Understanding the Basic Web Development Framework – User – Browser – Webserver – Backend Services – MVC Architecture – Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React

UNIT IV NODE JS

10 Hour

Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers – Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

UNIT III MONGO DB

11 Hour

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications.

Text Books

- Brad Dayley, Brendan Dayley, Caleb Dayley (2018), “Node.js, MongoDB and Angular Web Development”, Addison-Wesley, Second Edition,
- Vasan Subramanian, ‘Pro MERN Stack(2019), Full Stack Web App Development with Mongo, Express, React, and Node’, Second Edition, Apress,.

Reference Books:

- Chris Northwood(2018), “The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer”, Apress; 1st edition,
- Kirupa Chinnathambi(2018), “Learning React: A Hands-On Guide to Building Web Applications Using React and Redux”, Addison-Wesley Professional, 2nd edition.

e-Resource:

- https://www.tutorialspoint.com/the_full_stack_web_development/index.asp
- <https://www.coursera.org/specializations/full-stack-react>
- <https://www.udemy.com/course/the-full-stack-web-development/>

Course Outcomes:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Understand a system or process to meet given specifications with realistic constraints.	K1,K2
CO-2	Apply problem statements and function as a member of design team.	K3
CO-3	Analyze technical resources to develop a AR - Computations	K4
CO-4	Summarize technical documents and technical oral presentations related to design mini project results	K5
CO-5	Formulate virtual reality, augmented reality and using them to build Biomedical engineering applications	K6

CO-PSO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	2	2	1	2	1
CO-2	3	2	3	3	2	1
CO-3	3	3	2	3	2	2
CO-4	3	3	3	3	2	2
CO-5	3	3	3	2	3	2

High Correlation – 50%

Moderate Correlation – 40%

Low Correlation – 10%

III AND IV EVALUATION OF COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core Course - VII	PCSM318	Artificial Intelligence & Machine learning	Assignment	Poster Presentation
	Core Course - VIII	PCSM319	Network Security and Cryptography	Seminar	Working model
	Core Course - IX	PCSM320	Natural Language Processing	Assignment	Prototyping
	Elective (Generic / Discipline Centric)-V	PCSO301	Blockchain Technologies	Assignment	Poster Presentation
	Skill Enhancement Course SEC 3(Interdisciplinary)	PCSI302	Research Methodology	Assignment	Case study
IV	Core Courses – X	PCSM409	Digital Image Processing	Seminar	Working model
	Core Courses – XI	PCSM410	Data Science & Analytics	Assignment	Case study
	Elective-Discipline Specific	PCSO401	Augmented and Virtual Reality	Assignment	Poster Presentation

PROGRAMME PROFILE – B.Sc INFORMATION TECHNOLOGY

PREAMBLE

UG : Programme Profile and Syllabi of Courses from III to IV semesters along with Evaluation Components III and IV (With effect from 2023-2026 Batch Onwards)

PROGRAMME SPECIFIC OUTCOME

PSO No.	Upon completion of the Programme , the students will be able to
PSO 1	Understand and apply fundamental principles of Information Technology, including computer systems, networks, and software development
PSO 2	Acquire Analytical and Problem solving Skills and to develop proficiency in programming languages, database management, and web development to design and implement IT solutions to solve the real world problems
PSO 3	Demonstrate knowledge and skills in areas such as cybersecurity, data analytics, and cloud computing to ensure the security and efficiency of IT systems and Information sharing and retrieval for the usage of Applications
PSO 4	Apply project management principles and practices to effectively plan, execute, and manage IT projects.
PSO 5	Evaluate the efficiency and effectiveness of different Computational solutions and adhere to ethical and professional standards in information technology.
PSO 6	Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems and engage in lifelong learning in the field of Information Technology

PROGRAMME PROFILE – B.Sc INFORMATION TECHNOLOGY

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit Min/Max
I	I	Language: Tamil/ Hindi/ French	UTAL110	General Tamil-I/ Hindi-I/ French-I	5	3
	II	Language: English	UENL111	General English	5	3
	III	Core Courses - I	UITM101 UCSM111 /UCAM111/	Object Oriented in Python Programming	5	4
	III	Core Courses - II	UITR101 UCSR111 UCAR112	Python Programming using OOPs Practicals	5	4
	III	Elective Course 1 (Generic / Discipline Specific)	UMAA122	Numerical Methods	4	3
	IV	Skill Enhancement Course – SEC-1 (Non Major Elective)			2	2
	IV	Foundation Course FC	UITF101/ UCSF101	Principles of Information Technology	2	2
	IV	Ability Enhancement Compulsory Course (AECC 1) -Soft Skill	USKS103	Soft Skill-1	2	2
Total					30	23
II	I	Language : Tamil/ Hindi/ French	UTAL210	General Tamil II/ Hindi-II/ French-II	5	3
	II	LE: Language	UENL211	General English	5	3
	III	Core Courses - III	UITM201 UCAM208 /UCSM208	Advanced Data Structures & Algorithms	5	4
	III	Core Courses - IV	UITR202 UCAR208 /UCSR208/	Advanced Data Structure and Algorithms – Practicals	5	4
	III	Elective Course –II (Generic / Discipline Specific)	UMAA226	Graph Theory and itsapplications	4	3
	IV	Skill Enhancement Course – SEC-2 (Non Major Elective)			2	2

	IV	Skill Enhancement Course – SEC-3 (Discipline / Subject Specific)	UITD201	Multimedia - 3D Animation	2	2
	IV	Ability Enhancement Compulsory Course (AECC 2) Soft Skill-2	USKS203	Soft Skill-2	2	2
	III	Internship / Industrial Training	UITI201	Internship / Industrial Training		-/ 2
	V	Extension Activity/ Physical Education/NCC				1/2
	VI	Value added courses (Outside class hours)	UVCC201			-/2
Total					30	24/29
III	I	Language: Tamil/ Hindi/ French	UTAL310	General Tamil-III/ Hindi-III/ French-III	5	3
	II	Language: English	UENL311	General English	5	3
	III	Core Course - V	UITM301	Web Application Development	4	4
	III	Core Course – VI	UITR302	Web Application Development – Practicals	4	4
	III	Elective Course 3 (Generic / Discipline Specific) -EC3	UITD303	Operating system	4	3
	IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	UITU301/ UCSU301/ UCAU301	Graphics Design	2	1
	IV	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	UITR304	R Programming– Practical	2	2
	IV	Ability Enhancement Compulsory Course (AECC 3) Soft Skill-3	USKS303	Soft Skill-3	2	2
	IV	Value education	UGEV301	Value education	2	2
Total					30	24
	I	Language: Tamil/ Hindi/French	UTAL410	General Tamil IV/ Hindi-II/ French-II	5	3
	II	Language: English	UENL411	General English	5	3

IV	III	Core Course - VII	UITM401/ UCSM410/ UCAM408	Industry Module- Java Application Programming	5	4
	III	Core Course - VIII	UITM402	Software Engineering	5	4
	III	Elective Course - EC4 (Generic / Discipline Specific)	UITR403 UCSR413 UCAR409/	Java Application Programming- Practicals	4	3
	IV	Skill Enhancement Course – SEC-6	UITD404	Internet of Things	2	2
	IV	Skill Enhancement Course- Online course	UITD405	Online Course *	2	2
	IV	Ability Enhancement Compulsory Course (AECC 4) Soft Skill- 4	USKS403	Soft Skill-4	2	2
	III	Internship / Industrial Training	UCAI401	Internship / Industrial Training		-/ 2
	V	Extension Activity/ Physical Education/NCC				-/2
	VI	Value added course (Outside class hours)	UVCC401			-/2
Total					30	23/29
V	III	Core Course - IX	UITM501	Computer Networks	5	4
	III	Core Course - X	UITM502	Advanced Database Management System	5	4
	III	Core Course - XI	UITR501	RDBMS Lab	5	4
	III	Elective Course – EC5 (Generic / Discipline Specific)	UITD501	Information Security	5	3
	III	Elective Course – EC6 (Generic / Discipline Specific)	UITD502	Introduction to Data science	4	3
	III	Core Course - XII	UITP501	Project with Viva voce	4	4
	IV	Value Education	UGEV501	Value Education	2	2
Total					30	24
	III	Core Course - XIII	UITM601	Machine Learning	5	4
	III	Core Course - XIV	UITM602	Data Analytics	5	4
	III	Core Course - XV	UITR603	Android Programming Theory and Practical	5	4

VI	III	Elective Course – EC7 (Generic / Discipline Specific)	UITR604	PHP Practical	6	5
	III	Elective Course – EC8 (Generic / Discipline Specific)	UITD601	Fuzzy Logic	5	4
	III	Comprehensive viva-voce			-	1
	III	Internship / Industrial Training	UINS601	Internship / Industrial Training	-	1
	IV	Professional Competency Skill Enhancement Course SE8		Professional Competency Skill Enhancement Course SE8	4	2
	V	Extension Activity/ Physical Education/NCC			-	-/2
	VI	Value added course			-	-
Total					30	25/27
OVERALL TOTAL					180	140/156

WEB APPLICATION DEVELOPMENT

UITM301

Semester	: III	Credit	4
Category	: Core Course-V	Hour/Week	4
Class & Major	: II B.Sc IT	Total Hour	52

COURSE OBJECTIVES:

Co No.	To Enable The Students
CO1	Understand the Web Services and implementation model for SOA
CO2	Analyze the SOA, its Principles and Benefits
CO3	Examine the XML concepts
CO4	Apply the paradigms needed for testing Web Services
CO5	Create the different Test Strategies for SOA-based applications

UNIT-1 INTRODUCTION

10 Hours

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, Introduction to Web Services – The

definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

UNIT-II ARCHITECTURE OF WEB SERVICES

10 Hours

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services.

UNIT -III XML AND SOAP

12 Hours

Brief Overview of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging,

UNIT-IV WEB SERVICE DESCRIPTION LANGUAGE

10 Hours

Describing Web Services – WSDL introduction, non - functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

UNIT-V UDDI SERVICES

10 Hours

Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model ,Interfaces,UDDI Implementation.

TextBook

- Michael P (2012), “*Web Services & SOA Principles and Technology*”, Second Edition.

Reference book

- F.P.Coyle,XML(2002), “*Web Services, and the Data Revolution*”, Pearson Education.

e-Resources

- https://www.cs.uct.ac.za/mit_notes/web_programming.html
- https://mrcet.com/downloads/digital_notes/IT/WEB%20APPLICATION%20DEVELOPMENT.pdf

COURSE OUTCOMES:

CO.NO	On completion of the course the student will be able to	Blooms Level
CO1	Understand the principles of SOA	K1,K2
CO2	Apply OOP principles to creation of web service solutions	K3
CO3	Select the appropriate framework components in creationof web service Solution	K4

CO4	Determine the market leading environment tools to create and consume web services	K5
CO5	Develop and implement UDDI Data Model	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	3
CO3	3	3	2	2	3	2
CO4	3	3	3	1	2	1
CO5	3	3	1	3	1	2

High correlation-63%

Moderate Correlation-20%

Low Correlation-13%

WEB APPLICATION DEVELOPMENT PRACTICALS

UITR302

Semester	:III	Credit	:4
Category	:Core Course – VI	Hour/Week	:4
Class & Major	:II B.Sc IT	Total Hour	:52

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Impart Practical Training in Control panel tools.
CO3	Familiarize with HTML Tags
CO4	Provide knowledge on working with events and methods
CO5	Build programs using Java script.

LIST OF PROGRAMS

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.

5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
 - (a) The first multiple choice list, displays the Major dishes available.
 - (b) The second multiple choice list, displays the Starters available.
 - (c) The single choice list, displays the Soft drinks available.

COURSE OUTCOME:

CO.NO	On the successful completion of the course, students will be able to	Bloom sLevel
CO1	Recall all the Basic tools in Webpage.	K1,K2
CO2	Apply various effects on webpage.	K3
CO3	Analyze the use of java script and html code.	K4
CO4	Estimate the user-defined functions and implement in Java script.	K5
CO5	Develop webpage using tools and techniques.	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	1	2	1
CO2	3	3	1	1	2	2
CO3	3	2	3	3	3	3
CO4	3	3	2	3	2	3
CO5	3	3	2	3	3	3

High correlation- 60%

Moderate Correlation-26%

Low Correlation-14%

OPERATING SYSTEMS

UITD 303

Semester : III
Category : ELECTIVE COURSE 3
Class &Major: II B.Sc IT

Credit:3
Hour/Week: 4
Total Hour:52

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand the basic concepts of operating system, its functions and services.
CO2	Enhance the basic concepts of process management and synchronization
CO3	Familiarize the deadlock issues
CO4	Determine the various memory management schemes
CO5	Give exposure over I/O system and mass storage structures and linuxsystem

UNIT -I INTRODUCTION

10 Hours

Definition of Operating System-OS Structures :OS Services - System Calls - Virtual Machines - Process Management: Process Concept - Process Scheduling - Operation on Processes-Co-operatingProcesses-Inter-process Communication.

UNIT -II CPU SCHEDULING

10 Hours

Basic Concepts - Scheduling Criteria - Scheduling Algorithms – Process Synchronization: The Critical Section Problem-Semaphores-Classical Problems Of Synchronization –Critical Regions.

UNIT -III DEADLOCKS

10 Hours

System Model- Dead lock characterization–Methods for Handling Deadlock - Deadlock Prevention-Deadlock avoidance-Deadlock Detection –Recovery from Deadlock.

UNIT- IV STORAGE MANAGEMENT

10 Hours

Memory management - Swapping – Contiguous Memory allocation. Paging – Segmentation –Segmentation with Paging–Virtual memory: Demand paging- Page replacement – Thrashing. Mass-Storage Structure: Disk Structure- Disk scheduling.

UNIT-V FILE-SYSTEM INTERFACE

12 hours

File Concept-File Attributes-File Operations–Access Methods: Sequential Access–Direct Access –Directory S t r u c t u r e : Single-Level D i r e c t o r y - T w o – Level Directory-Tree-Structured Directories- Introducing Shell Programming–Linux General P u r p o s e Commands-Process Oriented Commands –Communication Oriented Commands

Textbooks

- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2012).”*OperatingSystem Concepts*”, 9th edition, Wiley Student Edition.

- B.Mohamed Ibrahim, (2005).”Linux Practical Approach”l,Firewall Media

Reference Books

- Milan Milenkovic (2003).”Operating System Concepts and Design”,McGraw Hill.
- Andrew S. Tanenbaum, (2001). ”Modern Operating Systems”, 2nd Edition,Prentice Hall ofIndia.
- Deital and Deital (1990).”Introduction to Operating System”, PearsonEducation.
- William Stallings (1997). ”Operating Systems”, Prentice Hall of India.

e-Resources

- <https://www.techtarget.com/whatis/definition/operating-system-OS>
- <https://www.britannica.com/technology/operating-system>

COURSE OUTCOMES:

CO.NO	On the successful completion of the course, students will be able to	Bloom’s Level
CO1	Understand the fundamental concepts of an OS and their respective functionality	K1,K2
CO2	Identify the importance of open source operating system commands	K3
CO3	Analyze and stimulate management activities of operating system	K4
CO4	Estimate the various services provided by the operating system.	K5
CO5	Discuss different problems related to Process, Scheduling, Deadlock, Memory and Files	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	1
CO2	3	3	3	3	3	2
CO3	3	2	3	2	2	2
CO4	3	3	3	3	3	3
CO5	3	3	2	3	1	3

High correlation- 63%

Moderate Correlation-30%

Low Correlation-7

GRAPHICS DESIGN

UITU301/ UCSU301/UCAU301

Semester : III

Category : Skill Enhancement Course SEC-4

Class &Major : II B.Sc IT

Credit : 1

Hour/Week: 2

Total Hour:26

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand about graphic design - its history and evolution along with its technology, and concepts.
CO2	Create the Principles of Graphic Design.

CO3	Apply the design principles and its uses
CO4	Analyze the different design processes and problem solving methods
CO5	Implement the techniques involved graphics design

UNIT-I FUNDAMENTALS OF DESIGN

5 Hours

Introduction to Graphic Design: Definition and history-Importance in communication-Basic Elements of Design: Point, line, and plane-Shape and form-Texture and pattern. Principles of Composition: Balance and symmetry, Scale and proportion, Rhythm and movement

UNIT-II COLOR THEORY AND APPLICATION

5 Hours

Color Basics: Color wheel and color relationships , Warm vs. cool colors. Color Theory: Color harmony and schemes-Psychological and cultural meanings of color. Applying Color in Design: Color in digital and print media, Techniques for effective color use.

UNIT-III TYPOGRAPHY AND TEXT

5Hours

Basics of Typography: Type anatomy and terminology-Type families and classifications. Principles of Typographic Design: Hierarchy and readability-Alignment, spacing, and grids. Advanced Typography-Expressive and experimental typography-Typography in branding and identity

UNIT-IV IMAGERY AND GRAPHICS

5 Hours

Working with Images: Types of images (vector vs. raster)-Image resolution and quality-Image Composition and Editing-Cropping, scaling, and color correction-Integrating images with text and graphics. Creating Original Graphics: Drawing and illustration techniques-Using software tools for graphic creation

UNIT-V DESIGN SYSTEMS AND APPLICATIONS

6 Hours

Layout and Grid Systems-Creating and using grids in design-Responsive and adaptive layouts. Branding and Identity Design-Developing a visual identity system-Logo design and application. Advanced Design Projects-Multi-page documents (e.g., brochures, magazines)-Interactive and digital design

Text Book :

- Ellen Lupton & Jennifer Cole Phillips,(2015). “Graphic Design: The New Basics” Princeton Architectural Press Revised and updated edition.

Reference Books:

- Edmund C.Arnold, (2020).*Modern News paper designs Harper &Rowpublishers,NEW YORK..*
- Click J.W, Russell and N.Baird,(2021).*Magazine Editing and production , DubuqueIowa, WM.Brown .*

e-Resources

- <https://edu.gcfglobal.org/en/beginning-graphic-design/fundamentals-of-design/1/>

- <https://study.com/academy/lesson/types-of-images-rasterized-vector-compound-graphics.html>

COURSE OUTCOMES:

CO.NO	On completion of the course the student will be able to	Bloom's Level
CO1	Understand the elements of design, principles of design and Aesthetics of design.	K1,K2
CO2	Apply the process of points, lines, and planes to create visual interest and structure in your designs..	K3
CO3	Describe the different types of fonts and effective use of Typography..	K4
CO4	Compare the dynamics of composition and color and the technical issues surrounding print and web distribution.	K5
CO5	Develop the new layout using techniques of Graphic Designer	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 69 %

Moderate Correlation -21%

Low Correlation-10%

**R-PROGRAMMING – PRACTICAL
UITR304**

Semester : IV
Category : Skill Enhancement course SEC-5
Class &Major: II B.SC IT

Credit : 2
Hour/Week : 2
Total Hour :26

COURSE OBJECTIVES:

CO.NO	To Enable The Students
CO1	Understand the core principles of R programming
CO2	Learn how to create vectors in R
CO3	Learn various mathematical operations in R programming
CO4	Read and write a csv file in R
CO5	Create the graphs and charts using R Programming.

LIST OF PROGRAMS:

1. Decision and loop constructs like If-Else, While, Break-Next and Repeat.
2. Basic mathematical operations in R programming.
3. Control structures in R.
4. Time series in R.
5. Data frames in R.
6. String Manipulation functions in R.
7. Different data structures in R (Vectors, Lists)
8. Read and Write a csv file and analyze the data in the file in R
9. Execute programs to use plot in R.
10. Graphs and Charts in R

COURSE OUTCOMES:

CO.NO	On Completion of the course the student will be able to	Bloom's Level
CO1	Define the R program basics with programs	K1,K2
CO2	Apply R Data types for developing programs.	K3
CO3	Examine the use of different R Data Structures.	K4
CO4	Evaluate programming logic using R Packages.	K5
CO5	Develop R programs that uses datasets of R programming with capabilities.	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	1	3	3
CO2	3	3	3	2	3	2
CO3	3	3	3	2	3	2
CO4	3	3	3	1	2	2
CO5	3	3	2	2	3	3

High correlation-72%

Moderate Correlation-21%

Low Correlation-7%

INDUSTRY MODULE : JAVA APPLICATION PROGRAMMING

UITM401/UCSM410/ UCAM408

Semester : IV

Credit: 4

Category : Core VII

Hour/Week : 5

Class & Major : II B.Sc IT

Total Hour : 65

COURSE OBJECTIVES:

CO.NO.	To enable the students
CO1	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
CO2	Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO3	Examine the important topics and principles of software development.
CO4	Create the ability to write a computer program to solve specified problems.
CO5	Design the Java SDK environment to create, debug and run simple Java programs

UNIT- I INTRODUCTION

13 Hours

Data Types, Variables and Arrays: Primary types – Integers – Floating point types – Characters – Booleans – Literals – Variables – Type Conversion and Casting – Automatic type Promotion in Expressions - One Dimensional Arrays– Multi Dimensional Arrays. Operators: Arithmetic Operators – Bitwise operators – Relational Operators – Boolean Logical Operators – Assignment Operator – Conditional Operator – Operator Precedence-Using parentheses.

UNIT-II OBJECT ORIENTED PROGRAMMING CONCEPTS

13 Hours

Class Fundamentals – Declaring objects- Assigning object Reference variables- Introducing Methods- Constructors-Garbage collection – Finalize() Method A Closer Look at Methods and classes: Overloading Methods-Using objects as parameters Argument passing –Returning objects- Recursion-Introducing Access control – understanding static –Introducing final – Nested and Inner classes- String class- Using command line arguments. Inheritance: Inheritance Basics –Using super- creating Multilevel Hierarchy - Method overriding –Dynamic Method Dispatch –Using Abstract class
–Using final with inheritance-The object class.

UNIT- III PACKAGES AND THREADS

13 Hours

Packages –Access Protection – Importing packages-Interfaces. Exception Handling: Introduction- Exception Types – Uncaught Exceptions- Using try and catch – Multiple catch

clauses –Nested try statements- throw – throws-finally. Multithreaded programming : Java Thread Model –MainThread –Creating a Thread –Creating Multiple Threads – Using is Alive() and join() – Thread priorities.

UNIT -IV APPLETS

13 Hours

Applet Basics – Applet Architecture –Applet Skeleton- Applet Display method – Requesting Repainting – HTML APPLET tag- Passing Parameters to Applet. Event Handling: Event Handling Mechanisms –Delegation Event Model –Event classes(The Action Event ,Item Event , Key Event, Mouse Event) – Sources of Events - Event Listener Interfaces(Action Listener, Item Listener, Key Listener, Mouse Listener).

UNIT- V INTRODUCTION TO AWT

13 Hours

AWT Classes – Window fundamentals – working with Frame Windows –working with Graphics– Working with color – Working with Fonts- AWT Controls

CASE STUDY-Develop a Java application prototype for the shopping cart functionality. Include features such as adding/removing items, updating quantities, and calculating the total price.-Design an educational platform in Java with HTML integration for course management, content delivery, and student interaction. Define the backend services for user authentication, course enrollment, and lesson delivery.

Text Book

- Herbert Schildt(2014). “Java - The Complete Reference”, Ninth Edition,McGrawHill Education.

Reference books

- E. Balagurusamy(2014). “Programming with Java”, Tata McGraw-HillEducation India.
- Sachin Malhotra & Saurabh Choudhary(2015). “Programming in JAVA”,2nd Ed,

e-Resources

- <https://www.programiz.com/java-programming>
- <https://www.w3schools.com/java/>
- <https://www.javatpoint.com/java-tutorial>

COURSE OUTCOMES:

CO	On completion of the course the student will be able to	Bloom’s level
CO1	Understand the Competence on the development of small to medium sized application programs that demonstrate professionally acceptable coding.	K1,K2
CO2	Apply the concept of object oriented programming throughJava.	K3
CO3	Analyze the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program.	K4
CO4	Evaluate the concepts of java programs for applets and graphics programming.	K5

CO5	Design the fundamental concepts of AWT controls, layouts and events.	K6
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CO - PSO MAPPING

CO-PSO	PSO 1	PSO2	PSO 3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	2
CO2	3	3	2	3	3	3
CO3	3	3	3	2	2	2
CO4	3	3	2	1	3	3
CO5	3	3	3	3	3	2

HIGH CORRELATION - 70% MODERATE CORRELATION - 26.67% LOW CORRELATION - 3.33%

SOFTWARE ENGINEERING UITM402

Semester	:IV	Credit	4
Category	:Core Course VIII	Hour/Week	5
Class & Major:	II B.Sc IT	Total Hour	65

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Basic SW engineering methods and practices, and their appropriate application.
CO2	Illustrate the requirements and specification for the software
CO3	Determine the software project planning and estimation
CO4	Understand the software testing approaches such as unit testing and integration testing
CO5	Create a software with Reliability, Robust and with Documentation.

UNIT- I INTRODUCTION TO SOFTWARE ENGINEERING

13 Hours

Definition - The changing nature of software - Software Myths - Terminologies - Role of Management in Software Development - Software Life Cycle Models: The Waterfall Model - Increment Process Model - Evolutionary Process Model - The Unified Process.

UNIT- II SOFTWARE REQUIREMENTS ANALYSIS AND SPECIFICATIONS

13Hours

Requirements Engineering-Type of Requirements-Feasibility Studies-Requirements Elicitation-Requirements Analysis-Requirements Documentation-Requirements Validation.

UNIT-III SOFTWARE PROJECT PLANNING

13Hours

Size Estimation - Cost Estimation - The Constructive Cost Model (COCOMO) - COCOMO II -

The Putnam Resource Allocation Model – Software Risk Management - Software Design: Definition- Modularity- Strategy of Design-Function Oriented Design.

UNIT-IV SOFTWARE TESTING

13Hours

A Strategic Approach to Software Testing- Terminologies-Functional Testing-Structural Testing-Levels of Testing-Validation Testing-Testing Tools.

UNIT-V SOFTWARE RELIABILITY

13Hours

Basic Concepts - Software Quality - McCall Software Quality Model-Boehm Software Quality Model-Capability Maturity Model-Software Maintenance: Definition-Process-Model ConfigurationManagement-Documentation.

Textbook

- K.KAgarwal,YogeshSingh(2021).”*SoftwareEngineering*”,6thEdition,NewAgeInternational Publishers

Reference Books

- Roger S. Pressman, —*Software Engineering – A Practitioners Approach*ll, 5th Edition, TataMc Graw Hill Publication.
- Panaj Jalote (2005).—*An Integrated Approach to Software Engineering*, 3rd Edition, NarosaPublication.
- Thomas T. Baker,(2004).—*Writing Software Documentation – A task oriented approach*ll,Second Edition, Pearson Education.

e-Resources

- <https://www.techtarget.com/whatis/definition/software-engineering>
- <https://www.javatpoint.com/software-engineering>

COURSE OUTCOMES:

CO.NO	On Completion of the course the student will be able to	Bloom’s Level
CO1	Define the basic terminologies involved in the entire software developmental lifecycle	K1,k2
CO2	Apply software engineering perspective through requirements analysis, software design and construction, verification, and validationto develop solutions to modern problems	K3
CO3	Compare and contrast different process,cost,quality models and testing techniques	K4
CO4	Estimate the project cost using suitable cost estimation models,rate the software Risks and evaluate management strategies for effective software development	K5

CO5	Create various testing Model for Software Quality	K6
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CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	1	1
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	2	3	3	2	1
CO5	3	3	3	2	1	2

High correlation- 70%

Moderate Correlation-16%

Low Correlation-13%

JAVA APPLICATION PROGRAMMING PRACTICALS

UITR403/UCAR409/ UCSR413

Semester : IV

Credit : 4

Category : Core VIII

Hour/Week : 5

Class & Major : II B.Sc IT

Total Hour : 65

COURSE OBJECTIVES:

Co. No	To Enable The Students
CO1	Understand the objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its application through hands-on training.
CO2	Examine the Object, Class, inheritance and recursion concepts in Java programming.
CO3	Implement and gain knowledge in packages, interfaces, exception and thread handling.
CO4	Implement AWT classes and windows fundamentals.
CO5	Create the programs to implement graphics, applets and event handling.

LAB EXERCISES

1. Extract a portion of a character string and print the extracted string.
2. Sort the given names in alphabetical order.
3. Multiply two given matrices using Multi-Threading Concepts.
4. Prepare a mark sheet using Abstract classes.
5. Find the area of a rectangle using constructor.
6. Find out the factorial of a given number using recursion.
7. Illustrate the concept of multiple inheritances.
8. Implement user defined packages and interfaces.

9. Implement the concept of exception handling.
10. Implement the concept of multithreading.
11. Applet to draw several shapes using graphics.
12. Applet to implement event handling.
13. Applet program to display a Bar chart using Swing Concepts..
14. Implement a calculator using AWT controls.
15. Display an analog clock using Graphics.

Text Books

- E. Balagurusamy(2019). “*Programming with Java – A Primer*” , TMH. ,5th Edition.

Reference books

- Patrick Naughton & Hebert Schildt(1999), The Complete Reference Java 2, 3rd Edition, TMH.
- John R. Hubbard(2004), Programming with Java,2nd Edition, TMH.

e-Resources

- <https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf>

COURSE OUTCOMES

CO.NO	On completion of the course the student will be able to	Bloom's Level
CO1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding	K1,K2
CO2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, and inheritance.	K3
CO3	Construct Java programs using Multithreaded Programming and Exception Handling.	K4
CO4	Implementation of AWT controls, layouts and windows fundamentals	K5
CO5	Create the programs to implement graphics, applets and event handling	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	2
CO2	3	3	3	3	3	3
CO3	3	3	3	2	3	2
CO4	3	3	2	2	3	3
CO5	3	3	3	3	2	1

HIGH CORRELATION - 73.34% MODERATE CORRELATION - 23.33% LOW CORRELATION - 3.33%

INTERNET OF THINGS

UITD404

Semester: IV

Category: Skill Enhancement course SEC 6

Class & Major: II B.Sc IT

Credit: 2

Hour/Week: 2

Total Hours: 26

COURSE OBJECTIVES:

Co No.	To Enable The Students
CO1	Understand the concepts of Internet of Things
CO2	Analyze the Communication Technologies in IOT
CO3	Examine the IOT Architecture and Deployment
CO4	Apply the IOT concepts in real time
CO5	Adapt the Security and Governance in IOT

UNIT- I INTRODUCTION

6 Hours

IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization.

UNIT-II COMMUNICATION IN IOT

5 Hours

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

UNIT -III IOT ARCHITECTURE

5 Hours

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT- IV IOT APPLICATIONS FOR VALUE CREATIONS

5 Hours

Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization,

Case Study:

IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value

for Industry, Home Management

UNIT -V INTERNET OF THINGS PRIVACY, SECURITY AND GOVERNANCE 5 Hours

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects .

Case Study:

Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

Text Books:

- David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry(2017).—”*IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet ofThings*”, Cisco Press, (UNIT I and II)
- Adrian McEwen and Hakim Cassimally(2014). “*Designing the Internet of Things*”, Wiley, (UNITIII, IV and V)

Reference Books:

- OvidiuVermesan and Peter Friess(2014). “*Internet of Things – From Research and Innovation toMarket Deployment*” , River Publishers.
- Peter Waher(2015). “*Learning Internet of Things*” ,Packt Publishing.
- Donald Norris(2015). “*The Internet of Things: Do-It-Yourself at Home Projects for Arduino,Raspberry Pi and BeagleBoneBlack*”,McGraw Hill.

COURSE OUTCOMES:

CO.NO	Course Outcomes	Blooms Level
CO1	Define the basic concepts and technologies in IOT.	K1,K2
CO2	Apply the concepts in the infrastructure for supporting IoT deployments	K3
CO3	Analyze the communication models used in IOT.	K4
CO4	Estimate the applications and working of IOT in different platforms	K5
CO5	Compare and contrast on security process used in IOT	K6

CO-PSO MAPPING:

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	3
CO2	3	3	2	1	3	3
CO3	3	3	2	3	2	3
CO4	3	3	2	3	2	1
CO5	3	3	2	3	3	3

High correlation-63%

Moderate Correlation-27%

Low Correlation-10%

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	ComponentIII	ComponentIV
III	III	Core V	UITM301	Web Application Development	Assignment	Simple Program Writing
	III	Core VI	UITR302	Web Practical-Practical	DPA	Viva-Voce
	IV	Elective Course 3	UITD303	Operating System	Assignment	Seminar
	IV	Skill Enhancement Sec-5	UITU301 UCSU30/ UCAU301	Graphics Design	Assignment	Seminar
IV	III	Core VII	UITM401 UCSM410 UCAM408 /	Industry Module:Java Application Prograaming	Assignment	Problem Solving
	III	Core VIII	UITR403 UCSR413 UCAR409/	Java Application Prograaming- Practicals	DPA	Viva-Voce
	III	Core VIII	UITM402	Software Engineering	Assignment	Seminar
	IV	Skill Enhancement Sec-6	UITD404	Internet of Things	Assignment	Seminar

DEPARTMENT OF COMPUTER APPLICATIONS

PREAMBLE

UG : Programme Profile and Syllabi of Courses from III to IV semesters along with Evaluation Components III and IV (With effect from 2023-2024 Batch Onwards)

PROGRAMME SPECIFIC OUTCOME

PSO No.	Upon completion of the Programme , the students will be able to
PSO1	Understand and develop a strong foundation in computer applications concepts, including programming languages, algorithms, computer networks, database management, and software engineering.
PSO2	Identify the system solutions using suitable computing techniques leading to propulsion towards employability.
PSO3	Communicate effectively in both technical and non-technical stakeholders and collaborate a team environment and leadership skills, and they will present their ideas, solutions and project outcomes in a clear and concise manner.
PSO 4	Apply computational methods, proficiency in programming languages and tools for solving real-time Problems.
PSO 5	Develop professional practices in the field of Computer Applications in adherence to ethical standards.
PSO 6	Demonstrate the ability to learn and adapt to emerging technologies and tools, and engage in lifelong learning in the field of computer applications.

PROGRAMME PROFILE – BACHOLER OF COMPUTER APPLICATION

Semester	Part	Category	Course Code	Course Title	Conta ct Hour/ Week	Credit Min/M ax
I	I	Language: Tamil/ Hindi/ French	UTAL110/ UHIL102/ UFRL102	General Tamil-I/Hindi-I/ French-I	5	3
	II	Language: English	UENL111	General English	5	3
	III	Core Courses - I	UCAM111/ UCSM111	Object Oriented in Python Programming	5	4
	III	Core Courses - II	UCAR112 UCSR111	Python Programming using OOPs Practical's	5	4
	III	Elective Course 1 (Discipline Specific)	UCAO101 UCAO102 UCAO103	a)Multimedia Systems b)Biometrics c)E-Commerce	4	3
	III	Allied – Discipline Non-Specific Elective- I	UMAA119	Statistical Methods and its Applications-I		
	IV	Foundation Course FC	UCAF101/ UCSF101	Problem Solving Computation	2	2
	IV	Skill Enhancement Course- SEC-1 (Non Major Elective)			2	2
	IV	Ability Enhancement Compulsory Course(AECC 1) - Soft Skill	USKS103	Soft Skill-1- Communicative English	2	2
Total					30	23
II	I	Language : Tamil/ Hindi/ French	UTAL210/ UHIL201/ UFRL201	General Tamil II/ Hindi-II/ French-II	5	3
	II	LE: Language	UENL211	General English	5	3
	III	Core Courses - III	UCAM208/ UCSM208/ UITM201	Advanced Data Structures & Algorithms	5	4
	III	Core Courses - IV	UCAR208/ UCSR208/ UITR202	Advanced Data Structure and Algorithms – Practical's	5	4
	III	Elective – Discipline Specific Elective – II	UCAO201 UCAO202 UCAO203	a) Cyber Forensics b) Information Security c) Human Computer Interaction	4	3
	III	Allied – Discipline Non-Specific Elective- II	UMAA225	Allied – Discipline Non-Specific Elective-I [Any One] a) Allied Mathematics-II		

				b) Statistical Methods and its Applications-II c) Cost and Management Accounting		
	IV	Skill Enhancement Course- SEC-2 (Non Major Elective)			2	2
	IV	Skill Enhancement Course – SEC-3 (Discipline / Subject Specific)	UCAD201/ UCSD201	Web Application Development Tools	2	2
	IV	Ability Enhancement Compulsory Course (AECC 2) Soft Skill-2	USKS203	Soft Skill-2	2	2
	III	Internship / Industrial Training	UINS202	Semester vacation 30 Hrs / Summer vacation 60 Hrs	-	-/2
	V	Extension Activity/ Physical Education/NCC				1/2
	VI	Value Added course				-/2
Total					30	24/29
III	I	Language: Tamil/ Hindi/ French	UTAL310/ UHIL301/ UFRL301	General Tamil-III/ / Hindi-III/French-III	5	3
	II	Language: English	UENL311	General English	5	3
	III	Core Course - V	UCAM308/ UCSM306	Microprocessor Architecture	4	4
	III	Core Course – VI	UCAR309/ UCSR309	Microprocessor Architecture – Practical's	4	4
	III	Elective – Discipline Specific Elective – III	UCAO301/ UCAO302/ UCAO303	a) Fuzzy Logic b) ERP c) Artificial Intelligence	4	3
	III	Allied – Discipline Non-Specific Elective- I	UCOA304	Financial Accounting		
	IV	Skill Enhancement Course -SEC-3(Discipline)	UCAD301	PHP	2	2
	IV	Skill Enhancement Course -SEC-3(Entrepreneurial)	UCAU301/ UCSU301/ UITU301	Graphics Design	2	1
	IV	Ability Enhancement Compulsory Course (AECC 3) Soft Skill-3	USKS303	Soft Skill-3	2	2
	IV	Value Education		Value Education	2	2
Total					30	24
	I	Language: Tamil/ Hindi/ French	UTAL410/ UHIL401/ UFRL401	General Tamil-IV/ Hindi-IV/French-IV	5	3

IV	II	Language: English	UENL411	English	5	3
	III	Core Course - VII	UCAM408 /UCSM410	Industry Module : Java Application Programming	5	4
	III	Core Course - VIII	UCAR409/UCSR413	Java Application Programming – Practical's	5	4
	III	Elective- Discipline Specific Elective – IV	UCAO401	a) Software Testing b) Image Processing c) Big data Analytics	4	3
	III	Allied – Discipline Non-Specific Elective- I	UMAA404	a) Allied Mathematics-II b) Statistical Methods and its Application- II c) Cost and Management Accounting		
	IV	Online course *	UONL401		2	2
	IV	Skill Enhancement Course – SEC-3 (Discipline / Subject Specific)	UCAD401	Mobile Application Development	2	2
	III	Internship / Industrial Training	UINS401		-	-/2
	IV	Ability Enhancement Compulsory Course (AECC) Soft Skill – 4	USKS403	Soft Skill-4	2	2
V	Extension Activity/ Physical Education/NCC				-/2	
VI	Value Added course				-/2	
Total					30	23/29
V	III	Core Course - IX	UCAM511	NET Programming	5	4
	III	Core Course - X	UCAM512	Database Management System	5	4
	III	Core Course - XI	UCAM513	NET Programming – Practical	5	4
	III	Core Course - XII	UCAP502	Project with Viva voce	4	4
	III	Elective- Discipline Specific Elective – V	UCAO501	a) Artificial Neural Network b) Pattern Recognition c) Introduction to Data Science d) Operation Research	5	3
	III	Elective- Discipline Specific Elective – VI	UCAO502	a) Cloud computing b) Agile Project Management c) Simulation and Modeling	4	3
	IV	Environmental Studies			2	2
Total					30	24
	III	Core Course - XIII	UCAM611	R Programming	5	4
	III	Core Course - XIV	UCAM612	Operating System	5	4
	III	Core Course - XV	UCAM613	Practical : R Programming	5	4
	III	Elective- Discipline Specific Elective – VII	UCAO601	a) Data Mining and Warehousing b) Network Security c) Robotics	6	4
	III	Elective- Discipline Specific Elective – VIII	UCAO602	a) Mobile Adhoc Network b) Computational Intelligence c) Grid Computing	5	3
		Comprehensive Viva-Voce				1

VI	III	Internship / Industrial Training (semester vacation 30 Hrs/)	UINS602		-	-/2
	IV	Professional Competency Skill	UCAC601	Professional Competency Skill [Competitive Examinations]	4	2
	V	Extension Activity/ Physical Education/NCC	-	-	-	-/2
	VI	Value Added Course	-	-	-	-
Total					30	22/26
OVERALL TOTAL					180	140/155

NON MAJOR ELECTIVE

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Skill Enhancement Course (Non Major Elective)	UCSE101/ UITE101 UCAE101	Office Automation	2	2
II	Skill Enhancement Course- SEC-2 (Non Major Elective)	UCSE211/ UITSE211/ UCAE211	Advanced Excel	2	2
III	Skill Enhancement Course- SEC-2 (Non Major Elective)	UCAE311	Web Development Application Tools	2	2
IV	Skill Enhancement Course- SEC-2 (Non Major Elective)	UCAE401	Python Programming	2	2

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Contact Hrs /week	Credit
I	Self-study Paper	UCAS101 UCAS102	C Programming Practical: C Programming	2	1
II	Self-study Paper	UCAS201 UCAS202	Desktop Publishing Hardware Trouble Shooting	2	1
III	Self-study Paper	UCAS301 UCAS302	Web Application Development Practical: Web Application Development.	2	1
IV	Self-study Paper	UCAS401 UCAS402	Computer Graphics Develops	2	1
V	Self-study Paper	UCAS501 UCAS502	Internet of Things Natural Language Processing	2	1
VI	Self-study Paper	UCAS601 UCAS602	Machine Learning Computing Intelligence	2	1

MICROPROCESSOR ARCHITECTURE
UCAM308/UCSM306

Semester :III
Category : Core Course V
Class&Major :II BCA

Credit : 4
Hour/Week: 4
TotalHour :52

COURSE OBJECTIVES

COs	To enable the students
CO1	Acquire skill about the microprocessor's evaluation.
CO2	Understand the 8085 instructions set.
CO3	Explore techniques for multiplication and division of numbers using assembly language.
CO4	Apply the types of convertors in Counters.
CO5	Utilize the microprocessor in various applications.

UNIT I EVOLUTION OF MICROPROCESSORS

10 Hours

Single Chip Microcomputer Microprocessor Applications – Programming Digital Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085/8086/80386 – Instruction Cycle – Timing diagram.

UNIT II INSTRUCTION SET OF INTEL 8085

11 Hours

Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions – Programming of Microprocessors – Assembly language – Assemblers – Stacks and Subroutines – MACRO – Microprogramming. Introduction to 8086 – architecture – pin description – External memory interfacing – bus cycle –some important companion chips - Maximum mode bus cycle-memory interfacing. The 80386 Modes of Operation.

UNIT III ASSEMBLY LANGUAGE PROGRAMMING

10 Hours

Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array – Arranging a series of numbers – Sum of a series of Numbers – Multiplication – Division – Multibyte Addition and Subtraction.

UNIT IV PERIPHERAL DEVICES AND INTERFACING

10 Hours

Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface – Programmable Counter / Interval Timer – A/D Converter and D/A Converter.

UNIT V MICROPROCESSOR APPLICATIONS

11 Hours

Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

Text Books

- Badri Ram (2013), Fundamentals of Microprocessors and Microcomputers, Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons.
- Douglas V. Hall (2015), "Microprocessors and Interfacing", Tata Mcgraw Hill.

Reference Books

- Ramesh S (2011).Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085 / 8080A, Wiley Eastern .
- Barry B. Brey (2000), "The Intel Microprocessors – 8086/8088,80186,286,386,486, Pentium Pro Processor", Prentice Hall of India Pvt. Ltd.

COURSE OUTCOME:

COs	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Acquire the basic Knowledge of Microprocessor.	K1,K2
CO2	Examine the concept of Microprocessor Applications	K3
CO3	Analysis the skill about Peripheral Devices and Interfacing.	K4
CO4	Develop the Microprocessor based Traffic Control.	K5
CO5	Explore the programming knowledge using 8085.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION 60% MODERATE CORRELATION - 33.33% LOW CORRELATION - 6.66%

MICROPROCESSOR ARCHITECTURE - PRACTICALS UCAR309/UCSR309

Semester :III

Credit : 4

Category : Core Course VI

Hour/Week : 4

Class&Major :II BCA

Total Hour :52

COURSE OBJECTIVES

CO NO	To enable the students
CO1	Acquire skill about the microprocessor's evaluation
CO2	Understand the 8085 instructions set.
CO3	Examine the ASCII Code generation.
CO4	Illustrate the process of convertors.
CO5	Develop the microprocessor in various applications.

LAB EXCERICES

1. Program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.

2. Program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. Perform multiplication and division of two 8 bit numbers using 8085.
4. Find the largest and smallest number in an array of data using 8085 instruction set.
5. Program to arrange an array of data in ascending and descending order.
6. Convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.
7. Program to initiate 8251 and to check the transmission and reception of character.
8. Interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes.
9. Interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.
10. Serial communication between two 8085 through RS-232 C port.

Text Books

- Badri Ram (2013), Fundamentals of Microprocessors and Microcomputers, Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons.
- Douglas V. Hall (2015), "Microprocessors and Interfacing", Tata Mcgraw Hill.

Reference Books

- Ramesh S.Gaonkar (2011), Microprocessor Architecture, Programming and Applications with the 8085 / 8080A, Wiley Eastern.
- Barry B. Brey(2000), "The Intel Microprocessors – 8086/8088,80186,286,386,486, Pentium Pro Processor", Prentice Hall of India Pvt. Ltd.

COURSE OUTCOME

CO's	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Acquire the basic Knowledge of Microprocessor.	K1,K2
CO2	Examine the concept of Microprocessor Applications	K3
CO3	Analysis the skill about Peripheral Devices and Interfacing.	K4
CO4	Develop the microprocessor in various applications.	K5
CO5	Explore the programming knowledge using 8085.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	2	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION - 60% MODERATE CORRELATION - 36.67% LOW CORRELATION - 3.33%

FUZZY LOGIC

UCAO301

Semester : III
Category : Major Core (DSC) - III
Class & Major : II BCA

Credit : 3
Hour/ Week: 4
Total Hour : 52

COURSE OBJECTIVES

CO NO.	To enable the students
CO-1	Understand the basic concept of Fuzzy logic
CO-2	Learn the various operations on relation properties
CO-3	Study about the membership functions
CO-4	Learn about the Defuzzification and Fuzzy Rule-Based System
CO-5	Develop the Applications of Fuzzy Logic.

UNIT - I INTRODUCTION

10 Hours

Introduction to Fuzzy Logic - Fuzzy Sets- Fuzzy Set Operations - Properties of Fuzzy Sets
- Classical and Fuzzy Relations: Introduction - Cartesian product of Relation - Classical Relations
- Cardinality of Crisp Relation.

UNIT - II OPERATIONS

10 Hours

Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations,
Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-
Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations ,Crisp Relation.

UNIT - III FUNCTIONS

11 Hours

Membership Functions: Introduction, Features of Membership Function, Classification of
Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.

UNIT - IV METHODS

10 Hours

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy
Relations, Defuzzification Methods, and Fuzzy Rule-Based System: Introduction, Formation of
Rules, Properties of Set of Rules.

UNIT - V APPLICATIONS

11 Hours

Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Antilock-Braking
System and Vehicle Speed-Estimation Using Fuzzy Logic.

Text Books

- S. N. Sivanandam, S. Sumathi and S. N. Deepa (2013) “ *Introduction to Fuzzy Logic using MATLAB*”, Springer-Verlag Berlin Heidelberg.
- George J.Klir /Bo Yuan (2014),”Fuzzy Sets and Fuzzy Logic”, Prentice Publication.

Reference Books

- Guanrong Chen and Trung Tat Pham (2015) “ *Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems*” Timothy.
- Timothy J Ross(2010), “*Fuzzy Logic with Engineering Application*”

e-Resource

- https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
- [Fuzzy Logic | Tutorial spoint](#)
- [Corey Schafer - YouTube](#)
- <https://www.javatpoint.com/fuzzy-logic>
- <https://www.guru99.com/what-is-fuzzy-logic.html>

COURSE OUTCOMES

CO's	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basics of Fuzzy sets.	K1,K2
CO-2	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations.	K3
CO-3	Analyze various fuzzification methods and features of Membership Functions.	K4
CO-4	Evaluate defuzzification methods for real time applications.	K5
CO-5	Design an application using Fuzzy logic and its Relations.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION- 60% MODERATE CORRELATION- 33.33% LOW CORRELATION - 6.67%

ENTERPRISE RESOURCE PLANNING

UCAO302

Semester : III

Category : Major Core (DSC) - III

Class &Major : II BCA

Credit : 3

Hour/ Week: 4

Total Hour : 52

COURSE OUTCOME:

CO NO.	To enable the students
CO-1	Understand the basic concepts, Evolution and Benefits of ERP.
CO-2	Know the need and Role of ERP in logical and Physical Integration.
CO-3	Identify the important business functions provided by typical business software such as enterprise resource planning and customer relationship management

CO-4	Develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth
CO-5	Preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills

UNIT - I INTRODUCTION

10 Hours

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP, ERP Vendors; Benefits & Limitations of ERP Packages.

UNIT - II NEED OF ERP

10 Hours

Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration. Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Man-agement (PLM), LAP, Supply chain Management.

UNIT - III MARKETING ON ERP

11 Hours

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications. Cloud and Open Source, Quality Management, Material Management, Financial Module, CRM and Case Study.

UNIT - IV IMPLEMENTATION

10 Hours

ERP Implementation Basics, , ERP implementation Strategy, ERP Implementation Life Cycle ,Pre- Implementation task,Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.

UNIT - V TOOLS AND APPLICATIONS

11 Hours

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into or-ganizational culture. Using ERP tool: either SAP or ORACLE format to case study.

Text Books

- Alexis Leon(2015),“*Enterprise Resource Planning*” ,Tata McGraw Hill.
- K. Ganesh, Sanjay Mohapatra, S. P. Anbuudayasankar, P. Sivakumar(2014), “*Enterprise Resource Planning Fundamentals of Design and Implementation*,Tata McGraw Hill.

Reference Books

- Diversified by Alexis Leon (2012),” *Enterprise Resource Planning*”, TMH, 2012

- Ravi Shankar & S. Jaiswal , Galgotia(2015),” Enterprise Resource Planning”,2015
e-Resource

- https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm
- <https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-planning/>
- <https://www.guru99.com/erp-full-form.html>
- 4 <https://www.oracle.com/in/erp/what-is-erp/>

COURSE OUTCOMES

CO's	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basic concepts of ERP.	K1,K2
CO-2	Identify different technologies used in ERP.	K3
CO-3	Examine the concepts of ERP Manufacturing Perspective and ERP Modules.	K4
CO-4	Discuss the benefits of ERP.	K5
CO-5	Develop different tools used in ERP P	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION- 60% MODERATE CORRELATION- 33.34% LOW CORRELATION - 6.66%

Artificial Intelligence UCAO303

Semester : III

Credit : 3

Category : Major Core (DSC) - III

Hour/ Week: 4

Class &Major : II BCA

Total Hour : 52

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the Various concepts of AI Techniques.
CO-2	Learn various Search Algorithm in AI.
CO-3	Design the probabilistic reasoning and models in AI.
CO-4	Apply Markov Decision Process.
CO-5	Implement the various type of Reinforcement learning.

UNIT - I NLP INTRODUCTION

10 Hours

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance. Introduction: Concept of AI- history-current status, scope, agents, environments,

Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT - II SEARCHALGORITHMS

10 Hours

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A*algorithm, Game Search.

UNIT - III PROBABILISTICREASONING

10 Hours

Probabilistic Reasoning: Probability, conditional probability, BayesRule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT - IV MARKOV DECISION PROCESS

10 Hours

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT - V REINFORCEMENT LEARNING

12 Hours

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Qlearning

Text Books

- Stuart Russell and Peter Norvig (2012) ,”*Artificial Intelligence: A Modern Approach*”,3rd Edition, Prentice Hall.
- Elaine Richand Kevin Knight (2013),”*ArtificialIntelligence*”, Tata Mc Graw Hill,4th Edition.

Reference Books

- Trivedi,M.C.,”*A(2014) Classical Approach to Artificial Intelligence* ”,Khanna Publishing House, Delhi.
- Saroj Kaushik(2011),”*ArtificialIntelligence*”,CengageLearningIndia.
- David Poole and Alan Mack worth (2012),” *Artificial Intelligence: Foundations for Computational Agents*”, Cambridge University Press.

e-Resource

- NPTEL&MOOCcoursestitledArtificialIntelligenceandExpertSystems
- <https://nptel.ac.in/courses/106106140/>
- <https://nptel.ac.in/courses/106106126/>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom’s Level
CO-1	Understand the various concepts of AI Techniques.	K1,K2
CO-2	Explain the various Search Algorithm in AI.	K3
CO-3	Describe the probabilistic reasoning and models in AI.	K4

CO-4	Apply Markov Decision Process.	K5
CO-5	Develop the various type of Reinforcement learning Techniques.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	2	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION- 60% MODERATE CORRELATION- 36.66% LOW CORRELATION – 3.33%

PHP

UCAD301

Semester	: III	Credit	2
Category	: Skill Enhancement Course -SEC-3(Discipline)	Hour/Week	: 2
Class &Major	: II BCA	Total Hour	26

COURSE OBJECTIVES

CO.NO	To enable the students
CO1	Understand the basic concepts of PHP and its essentials.
CO2	Create functions, web pages and how to implement PHP programs.
CO3	Learn how to implement PHP programs using object-oriented programming concepts.
CO4	Explain Files, databases, session, cookies and File transfer Protocols.
CO5	Implement some features of AJAX in PHP programming.

UNIT I INTRODUCTION TO PHP 5 Hours

Essentials of PHP - Operators and Flow Control - Strings and Arrays.

UNIT II FUNCTIONS AND WEB PAGES 5 Hours

Creating Functions - Reading Data in Web Pages - PHP Browser - Handling Power.

UNIT III ADVANCED OBJECT ORIENTED PROGRAMMING 5 Hours

Object-Oriented Programming –Advanced Object-Oriented Programming.

UNIT IV INTRODUCTION TO SESSIONS AND COOKIES 5 Hours

File Handling –Working with Databases – Sessions, Cookies, and FTP

UNIT V INTRODUCTION TO AJAX SERVER 6 Hours

Ajax – Advanced Ajax – Drawing Images on the Server.

Text Books

- Steven HolZner(2020), “The PHP Complete Reference”, McGraw Hill Education, New

York

Reference Books

- Vikram Vaswani (2009), “PHP: A Beginner's Guide”, McGraw Hill Education, New York.

e-Resources

- https://www.tutorialspoint.com/php/php_tutorial.pdf
- https://users.ju.edu/arana/mshi506/PHP_Tutorial_Guide.pdf

COURSE OUTCOMES

CoNo	On completion of the course the student will be able to	Blooms Level
CO1	Learn about the PHP fundamentals and problem solving	K1,K2
CO2	Understand the basic concepts of web page creations.	K3
CO3	Describe the reason why different tags are used in PHP programs.	K4
CO4	Demonstrate the concepts of Session and Cookies.	K5
CO5	Develop the PHP program using AJAX server.	K6

CO - PSO MAPPING

CO/PSO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

HIGH CORRELATION- 60% MODERATE CORRELATION- 33.37% LOW CORRELATION – 6.66%

GRAPHICS DESIGN

UCSU301/UITU301/ UCAU301

Semester : III

Credit :1

Category : Core Course VI

Hour/Week: 2

Class &Major : II B.Sc Computer Science

Total Hour : 26

COURSE OBJECTIVES:

CO.NO	To enable the students
CO1	Understand about graphic design - its history and evolution along with its technology, and concepts.
CO2	Create the Principles of Graphic Design.
CO3	Apply the design principles and its uses

CO4	Analyze the different design processes and problem solving methods
CO5	Implement the techniques involved graphics design

UNIT-I FUNDAMENTALS OF DESIGN

5 Hours

Introduction to Graphic Design: Definition and history-Importance in communication-Basic Elements of Design:Point, line, and plane-Shape and form-Texture and pattern. Principles of Composition: Balance and symmetry, Scale and proportion, Rhythm and movement

UNIT-II COLOR THEORY AND APPLICATION

5 Hours

Color Basics: Color wheel and color relationships , Warm vs. cool colors. Color Theory: Color harmony and schemes-Psychological and cultural meanings of color. Applying Color in Design: Color in digital and print media, Techniques for effective color use.

UNIT-III TYPOGRAPHY AND TEXT

5 Hours

Basics of Typography: Type anatomy and terminology-Type families and classifications. Principles of Typographic Design : Hierarchy and readability-Alignment, spacing, and grids. Advanced Typography-Expressive and experimental typography-Typography in branding and identity

UNIT-IV IMAGERY AND GRAPHICS

5 Hours

Working with Images: Types of images (vector vs. raster)-Image resolution and quality-Image Composition and Editing-Cropping, scaling, and color correction-Integrating images with text and graphics. Creating Original Graphics: Drawing and illustration techniques-Using software tools for graphic creation

UNIT-V DESIGN SYSTEMS AND APPLICATIONS

6 Hours

Layout and Grid Systems-Creating and using grids in design-Responsive and adaptive layouts. Branding and Identity Design-Developing a visual identity system-Logo design and application. Advanced Design Projects-Multi-page documents (e.g., brochures, magazines)-Interactive and digital design

Text Book

- Ellen Lupton & Jenfer Cole Phillips,(2015). “*Graphic Design: The New Basics*” Princeton Architectural Press Revised and updated edition.

Reference Books

- Edmund C.Arnold, (2020).*Modern News paper designs Harper &Rowpublishers, NEW YORK..*
- Click J.W, Russell and N.Baird,(2021).”*Magazine Editing and production*”, Dubuque Iowa, WM.Brown .

e-Resources

- <https://edu.gcfglobal.org/en/beginning-graphic-design/fundamentals-of-design/1/>
- <https://study.com/academy/lesson/types-of-images-rasterized-vector-compound-graphics.html>

COURSE OUTCOMES:

Co.No	On completion of the course, the student will be able to	Bloom's Level
CO1	Understand the elements of design, principles of design and Aesthetics of design.	K1,K2
CO2	Apply the process of points, lines, and planes to create visual interest and structure in your designs..	K3
CO3	Describe the different types of fonts and effective use of Typography..	K4
CO4	Compare the dynamics of composition and color and the technical issues surrounding print and web distribution.	K5
CO5	Develop the new layout using techniques of Graphic Designer	K6

CO-PSO MAPPING

CO-PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	3	3	3	3	2	2

High Correlation- 69 %

Moderate Correlation -21%

Low Correlation-10%

INDUSTRY MODULE: JAVA APPLICATION PROGRAMMING

UCAM408/ UCSM410

Semester : IV
Category : Core VII
Class & Major : II BCA

Credit : 4
Hour/Week : 5
Total Hour : 65

COURSE OBJECTIVES

CO.NO.	To enable the students
CO1	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
CO2	Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO3	Examine the important topics and principles of software development.
CO4	Create the ability to write a computer program to solve specified problems.
CO5	Design the Java SDK environment to create, debug and run simple Java programs

UNIT I INTRODUCTION

13 Hours

Data Types, Variables and Arrays: Primary types – Integers – Floating point types –

Characters – Booleans – Literals – Variables – Type Conversion and Casting – Automatic type Promotion in Expressions - One Dimensional Arrays– Multi Dimensional Arrays. Operators: Arithmetic Operators – Bitwise operators – Relational Operators – Boolean Logical Operators – Assignment Operator – Conditional Operator – Operator Precedence-Using parentheses.

UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS

13 Hours

Class Fundamentals – Declaring objects- Assigning object Reference variables- Introducing Methods- Constructors-Garbage collection – Finalize() Method A Closer Look at Methods and classes: Overloading Methods-Using objects as parametersArgument passing – Returning objects- Recursion-Introducing Access control – understanding static –Introducing final – Nested and Inner classes- String class- Using command line arguments. Inheritance: Inheritance Basics –Using super- creating Multilevel Hierarchy - Method overriding –Dynamic Method Dispatch –Using Abstract class –Using final with inheritance-The object class.

UNIT III PACKAGES AND THREADS

13 Hours

Packages –Access Protection – Importing packages-Interfaces. Exception Handling: Introduction- Exception Types – Uncaught Exceptions- Using try and catch – Multiple catch clauses –Nested try statements- throw – throws-finally. Multithreaded programming : Java Thread Model –Main Thread –Creating a Thread –Creating Multiple Threads – Using is Alive() and join() –Thread priorities

UNIT IV APPLETS

13 Hours

Applet Basics – Applet Architecture –Applet Skeleton- Applet Display method – Requesting Repainting – HTML APPLET tag- Passing Parameters to Applet. Event Handling: Event Handling Mechanisms –Delegation Event Model –Event classes(The Action Event ,Item Event , Key Event, Mouse Event) – Sources of Events - Event Listener Interfaces(Action Listener, Item Listener, Key Listener, Mouse Listener).

UNIT V INTRODUCTION TO AWT

13 Hours

AWT Classes – Window fundamentals – working with Frame Windows –working with Graphics– Working with color – Working with Fonts. Using AWT Controls: Controls Fundamentals – Labels – Using Buttons –Applying check Boxes – Check Box group – Choice Controls – Using a Text field – Using a Text Area – Understanding Layout Managers [Flow Layout Only] – Menu Bars and Menus.

Text Books

- Herbert Schildt(2014), “Java - The Complete Reference”, Ninth Edition, McGrawHill Education.

Reference books

- E. Balagurusamy(2014), “Programming with Java”, Tata McGraw-Hill Education India.
- Sachin Malhotra &Saurabh Choudhary(2015), “Programming in JAVA”, 2nd Ed,

e Resources

- <http://developer.java.sun.com>
- javatutorial-w3schools
- learn java programming-javatpoint

COURSE OUTCOMES

CO	On completion of the course the student will be able to	Bloom's level
CO1	Understand the Competence on the development of small to medium sized application programs that demonstrate professionally acceptable coding.	K1,K2
CO2	Apply the concept of object oriented programming through Java.	K3
CO3	Analyze the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program.	K4
CO4	Evaluate the concepts of java programs for applets and graphics programming.	K5
CO5	Design the fundamental concepts of AWT controls, layouts and events.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	2	2	3	2	3
CO3	3	3	2	2	2	2
CO4	2	2	3	3	3	2
CO5	2	2	3	2	3	3

HIGH CORRELATION- 46.66% MODERATE CORRELATION- 53.33% LOW CORRELATION – Nil

JAVA APPLICATION PROGRAMMING PRACTICALS

UCAR409/ UCSR413

Semester : IV
Category : Core VIII
Class & Major : II BCA

Credit : 4
Hour/Week : 5
Total Hour : 65

COURSE OBJECTIVES

Co.No.	To Enable The Students
CO1	Understand the objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.

CO2	Examine the Object, Class, inheritance and recursion concepts in Java programming.
CO3	Implement and gain knowledge in packages, interfaces, exception and thread handling.
CO4	Implement AWT classes and windows fundamentals.
CO5	Create the programs to implement graphics, applets and event handling.

LAB EXERCISES

1. Extract a portion of a character string and print the extracted string.
2. Sort the given names in alphabetical order.
3. Add two matrices.
4. Prepare a marksheet using class and objects.
5. Find the area of a rectangle using constructor.
6. Find out the factorial of a given number using recursion.
7. Illustrate the concept of multiple inheritances.
8. Implement user defined packages and interfaces.
9. Implement the concept of exception handling.
10. Implement the concept of multithreading.
11. Applet to draw several shapes using graphics.
12. Applet to implement event handling.
13. Applet program to display a message with different colors, size and fonts.
14. Implement a calculator using AWT controls.
15. Display an analog clock using Graphics.

Text Books

- E. Balagurusamy(2019), Programming with Java – A Primer, , TMH. ,5th Edition.

Reference books

- Patrick Naughton& Hebert Schildt, The Complete Reference Java 2, 3rd Edition, TMH.
- John R. Hubbard, Programming with Java,2nd Edition, TMH.

e Resources

- <https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf>

COURSE OUTCOME

CO.NO	On completion of the course the student will be able to	Bloom's Level
CO1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding	K1,K2
CO2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, and inheritance.	K3
CO3	Construct Java programs using Multithreaded Programming and Exception Handling.	K4
CO4	Implementation of AWT controls, layouts and windows fundamentals	K5
CO5	Create the programmes to implement graphics, applets and event handling	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	2	2	3	2	2
CO3	3	3	2	2	3	3
CO4	2	2	3	3	2	3
CO5	2	3	3	2	3	3

HIGH CORRELATION- 53.33% MODERATE CORRELATION - 46.66% LOW CORRELATION-NIL

SOFTWARE TESTING

UCAO401

Semester :IV

Category :ElectiveIV

Class& Major:II BCA

Credit 3

Hour/Week:4

TotalHour :52

COURSE OBJECTIVES:

COs	To enable the students
CO1	Acquire Knowledge for Software Testing.
CO2	Analyze Quality Assurance and Control.
CO3	Evaluate the Quality of Project.
CO4	Develop a strong understanding of test planning and strategy creation.
CO5	Create, identify and report defects in software applications.

UNIT I INTRODUCTION

11Hours

Introduction to Quality - Historical Perspective of Quality - Definitions of Quality - Core Components of Quality - Quality View - Customer, Suppliers and Processes - The Purpose of Testing. Basic Concepts of Software Testing: Introduction- Definition of Testing- Basic Principles of Testing-WorkBench-TestPolicy-TestStrategy-DevelopingTestStrategy- Test Methodologies.

UNIT II TESTCASEDESIGNSTRATEGIES

11Hours

TestcaseDesignStrategies–UsingBlackBoxApproachttoTestCaseDesign–BoundaryValue Analysis – Equivalence Class Partitioning – State Based Testing – Cause-Effect Graphing – Compatibility

Testing – User Documentation Testing – Domain Testing – Random Testing –Requirements Based Testing – Using White Box Approach to Test Design – Test Adequacy Criteria– Static Testing vs. Structural Testing–Code Functional Testing.

UNIT III VERIFICATION AND VALIDATION

10 Hours

Software Verification and Validation: Introduction-Verification-Verification Work Bench - Methods of Verification - Types of Review on The Basis of Stage/Phase - Coverage in Verification- Concerns of Verification–Validation-Work Bench–Levels-Acceptance Testing- Software Development Verification and Validation Activities. V-Test Model-Analyzing and Reporting Test Results.

UNIT IV TESTING TECHNIQUES AND TOOLS

10 Hours

Testing Techniques and Tools: Levels of Testing - Acceptance Testing: Introduction - Acceptance Criteria-Importance of Acceptance Criteria-Alpha Testing-Beta Testing-Gamma Testing - Acceptance Testing During Each Phase of Software Development – Software Development Methodologies –Developing Acceptance Plan.

UNIT V TEST AUTOMATION

10 Hours

Software test automation – skills needed for automation – scope of automation – design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Test Metrics and Measurements–Project, Progress and Productivity Metrics.

Text Books

- Shen, J.J. (2019). *Software Testing: Techniques, Principles, and Practices*.
- Krishna Rungta. (2019). *Software Testing Learn Testing in 1 Day*. Kindle Edition.

Reference Books

- Dr. Anand Nayyar. (2019). *Instant Approach to Software Testing: Principles, Applications, Techniques, and Practices*.

e-Resources

- <https://www.youtube.com/watch?v=T3q6QcCQZQg>
- <https://developer.android.com/studio>

COURSE OUTCOMES

COs	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Learn to find and report software defects accurately.	K1, K2
CO2	Develop skills to create thorough test plans.	K3
CO3	Acquire the ability to assess and address testing risks.	K4
CO4	Improve communication of test results to stakeholders.	K5
CO5	Develop a commitment to staying updated in the field.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	2	2	3	2	3
CO3	3	3	2	2	2	2
CO4	2	2	3	3	3	2
CO5	2	2	3	2	3	3

HIGH CORRELATION 46.66% MODERATE CORRELATION - 53.33% LOW CORRELATION -NIL

IMAGE PROCESSING UCAO402

Semester :IV
Category :ElectiveIV
Class&Major:II BCA

Credit 3
Hour/Week: 4
Total Hour :52

COURSE OBJECTIVES

CO's	To enable the students
CO1	Understand the basic elements of visual perception relevant to digital image processing.
CO2	Explore the basics of spatial filtering and its applications in image enhancement and noise reduction
CO3	Apply the Image restoration techniques.
CO4	Design the concepts of image representation and recognition.
CO5	Create the degrees of image resolution and compression methods

UNIT I FUNDAMENTALS

10 Hours

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models .

UNIT II IMAGE ENHANCEMENT

10 Hours

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering –w2`Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters

UNIT III IMAGE RESTORATION AND SEGMENTATION

10 Hours

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters –Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models

UNIT IV WAVELETS AND IMAGE COMPRESSION

10 Hours

Wavelets – Subband coding – Multi resolution expansions, Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION

10 Hours

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments – Regional Descriptors

Text Books

- Rafael C. Gonzalez, Richard E.Woods (2019), Pearson Edition, Fourth edition, "Digital Image Processing".
- Sonka, Hlavac, Boyle(2013), Cengage Learning "Digital Image Processing and Computer Vision".

Reference Books

- S. Sridhar , 2016, Oxford University Press; Second edition “Digital Image Processing”.
- Gonzalez &woods , 2016, Pearson Edition “Digital Image Processing”, India.
- Anil Jain K (2011), PHI Learning Pvt. Ltd, “Fundamentals of Digital Image Processing”.

COURSE OUTCOMES

CO’s	On the successful completion of the course, students will be able to	Bloom’s Level
CO1	Understand the fundamentals of images.	K1,K2
CO2	Apply the basic concepts of image enhancements.	K3
CO3	Describe the concepts of image restoration and segmentation.	K4
CO4	Demonstrate the concepts of Wavelets and compression methods.	K5
CO5	Design the concepts of image representation and recognition.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	3	2	2	3	2	3
CO3	3	3	2	2	2	2
CO4	2	2	3	3	3	2
CO5	2	2	3	2	3	3

HIGH CORRELATION - 46.66% MODERATE CORRELATION - 53.33% LOW CORRELATION -NIL

**BIG DATA ANALYTICS
UCAO403**

Semester :IV
Category :Elective IV
Class&Major :II BCA

Credit 3
Hour/Week :4
Total Hour :52

COURSE OBJECTIVES

COs	To enable the students
CO1	Understand the fundamental concepts of big data analytics
CO2	Learn to use various techniques for mining data stream.
CO3	Apply the Big data Business Perspective
CO4	Explore the applications using Map Reduce Concepts
CO5	Design the programming tools HIVE in Hadoop echo system.

UNIT-I INTRODUCTION TO BIG DATA

10 Hours

Understanding Big Data: Concepts and terminology, Big Data Characteristics, Different types of Data Identifying Data Characteristics - Big Data Architecture - Big Data Storage: File system and Distributed File System, NoSQL, Sharding, Replication, Sharding and Replication, ACID and BASE Properties.

UNIT -II HADOOP FRAMEWORK

10 Hours

Hadoop Architecture - Hadoop Distributed File System (HDFS) –YARN – Hadoop I/O – Map Reduce Developing a map-reduce application – Map-reduce working procedure – Types and Formats - Features of Map reduce: sorting and joins- Pipelining MapReduce jobs.

UNIT-III HADOOP TECHNOLOGIES-PIG

11 Hours

Introduction, Parallel processing using Pig, Pig Architecture, Grunt, Pig Data Model-scalar and complete types. Pig Latin- Input and output, Relational operators, User defined functions -Working with scripts. Hadoop Operations.

UNIT - IV HIVE

11 Hours

Introduction-Hive modules, Data types and file formats, Hive QL-Data Definition and Data Manipulation-Hive QL queries, Hive QL views- reduce query complexity. Hive scripts. Hive QL Indexes- Aggregate functions Bucketing vs Partitioning.

UNIT-V SPARK

10Hours

Overview of Spark – Hadoop Overview of Spark – Hadoop vs. Spark – Cluster Design – Cluster Management – performance, Application Programming interface (API): Spark Context, Resilient Distributed Datasets, Creating RDD, RDD Operations, and Saving RDD - Lazy Operation – Spark Jobs.

Text Books

- Thomas Erl, Wajid Khattak, and Paul Buhler (2016), Big Data Fundamentals: Concepts, Drivers &Techniques, Pearson India Education Service Pvt. Ltd., First Edition.
- Tom White, (2015) Hadoop: The Definitive Guide, O'Reilly Media, Inc., Fourth Edition“.

Reference Books

- AnandRajaraman and Jeffrey David Ullman (2012), CUP “Mining of Massive Datasets”.
- Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos (2012), McGrawHill Publishing “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”.
- Bill Franks (2012), Wiley & Sons “Taming the Big Data Tidal Wave: Finding OpportUNITies in Huge Data Streams with Advanced Analytics”.
- Glenn J. Myatt (2007), Wiley & Sons, “Making Sense of Data”.

COURSE OUTCOMES

CO's	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Understand the basic concepts of Streams.	K1,K2
CO2	Apply about the PHP fundamentals of Big Data.	K3
CO3	Describe the big data perspective and its importance.	K4
CO4	Demonstrate the concepts of Hadoop and MapReduce	K5
CO5	Develop the Framework using Pig and Hive.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	2	3
CO2	3	3	1	2	1	2
CO3	3	1	2	2	3	3
CO4	3	2	3	3	2	2
CO5	1	3	3	1	3	3

HIGH CORRELATION - 46.66% MODERATE CORRELATION – 36.66% LOW CORRELATION -16.66%

Mobile Application Development

UCAD401

Semester : III

Credit : 2

Category : Major Core (DSC) - III

Hour/ Week: 2

Class &Major : II BCA

Total Hour : 26

Course Objectives:

COs	To enable the students
CO1	Understand the Concepts of GSM, SMS, and GPRS Architecture.
CO2	Apply the basic concepts of Mobile IP used in Network Layer.
CO3	Acquire Knowledge of Wireless Protocols
CO4	Implement the Concepts of Mobile Application Development Platform.
CO5	Design various services in Mobile Application Development

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS ARCHITECTURE 8 Hours

Frequency Spectrum-Multiplexing-Spread Spectrum-GSM vs CDMA --Comparison of 2G, 3G, 4G
-GSM Architecture-Entities-Call Routing-Address and Identifiers

UNIT II MOBILE WIRELESS SHORT RANGE NETWORKS 7 Hours

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11
Architecture-WLAN MAC-Security of WLAN, Power Management-Standards-WAP Architecture

UNIT III MOBILE IP NETWORK LAYER, TRANSPORT LAYER 8 Hours

IP and Mobile IP Network Layer-Packet delivery and Handover Management-Location
Management-Registration-Tunneling and Encapsulation-Route Optimization-Mobile Transport Layer.

UNIT IV MOBILE APPLICATION DEVELOPMENT USING ANDROID 8 Hours

Mobile Applications Development -Understanding the Android Software Stack –Android Application

Architecture –The Android Application Life Cycle –The Activity Life Cycle.

UNIT-V MOBILE APPLICATION DEVELOPMENT USING ANDROID

8 Hours

Services-Broadcast Receivers –Adapters –Data Storage, Retrieval and Sharing-Location Based Services-Development of Simple Mobile Applications.

Text Books

- Asoke,K.Talukder. HasanAhmed. Roopa,R.Yavagal.(2010).*Mobile Computing*. Tata McGraw Hill Pub .(2ndEd.)
- Barry,A. Burd.(2015).*Android Application Development for Dummies All in One*, Wiley.
- Ed, Burnette. Hello. (2012).*Android: Introducing Google's Mobile Development Platform*.(3rd Ed.). Pragmatic Programmers.

Reference Books

- Maritn, Sauter. (2011).*From GSM to LTE:An Introduction to Mobile Networks and MobileBroadband*. John Wiley and Sons.
- Raj Kamal.(2012).*Mobile Computing*. Oxford Higher Education.(2nd Ed.).

E-Resources

- https://youtu.be/jGwO_UgTS7I?list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU
- <https://youtu.be/WSbgixdC9g8>

COURSE OUTCOMES

COs	On the successful completion of the course, students will be able to	Blooms Level
CO1	Understand a Wide Variety of Wireless Communication.	K1, K2
CO2	Develop Mobile IP in Network Layer	K3
CO3	Evaluate Mobile Applications Development	K4
CO4	Apply Android in Mobile Application Network	K5
CO5	Implement services in Mobile Application Development.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	2	3	3	2	3
CO3	2	3	3	2	3	2
CO4	3	1	3	3	1	3
CO5	2	3	3	3	2	2

HIGH CORRELATION - 46.66% MODERATECORRELATION –36.66% LOW CORRELATION-6.66%

WEB APPLICATION DEVELOPMENT UCAE311

Semester : III

Credit : 2

COURSE OBJECTIVES

COs	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Impart Practical Training in Control panel tools.
CO3	Familiarize with HTML Tags
CO4	Build programs using Java script.
CO5	Provide knowledge on working with events and methods

LIST OF PROGRAMS

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on).
Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
 - (a) The first multiple choice list, displays the Major dishes available.
 - (b) The second multiple choice list, displays the Starters available.
 - (c) The single choice list, displays the Soft drinks available

COURSE OUTCOME:

COs	On the successful completion of the course, students will be able to	Bloom s Level
CO1	Study all the Basic tools	K1,K2
CO2	Practice the usage of web page creation and useable objects.	K3
CO3	Apply various effects on webpage.	K4
CO4	Analysis the use of java script and html code.	K5
CO5	Understand the user-defined functions and implement in Java script.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	2
CO2	3	2	2	3	2	3
CO3	3	3	2	2	2	3
CO4	3	2	3	3	2	3
CO5	2	2	3	2	2	2

HIGH CORRELATION - 50% MODERATECORRELATION –50% LOW CORRELATION -Nil%

Python Programming UCAE401

Semester : IV
Category : Skill Enhancement Course- SEC-2 (NME)
Class &Major : II BCA

Credit : 2
Hour/Week : 2
Total Hour :26

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire programming skills in core Python.
CO-2	Acquire Object-oriented programming skills in Python
CO-3	Develop the skill of designing graphical-user interfaces (GUI) in Python.
CO-4	Develop the ability to write database applications in Python.
CO-5	Acquire Python programming skills to move into specific branches

List of Programs:

1. All kinds of Data types.
2. Operators
3. Decision Making
4. Looping
5. Functions
 - a. Calling Value-Returning Functions
 - b. Calling Non-Value-Returning Functions
 - c. Recursive Functions
6. Dictionaries', List, tuples, sets and Dictionary.
7. Object Oriented Programming
 - a. Class
 - b. Constructor
 - c. Polymorphism
 - d. Inheritance

8. Files.
9. Exception Handling
10. Database programming.

**WEB APPLICATION DEVELOPMENT
UCAS301**

Semester :III
Category :Self-study
Class & Major :II BCA

Credit : 1
Hour/Week: 2
Total Hour :26

COURSE OBJECTIVES

COs	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Learn the Process of CSS.
CO3	Examine the web pages.
CO4	Develop insight on script objects.
CO5	Create the Java Script libraries

UNIT I STRUCTURING DOCUMENTS FOR THE WEB

9 Hours

Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages

UNIT II TABLES

8 Hours

Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using Element, Nested Framesets, Inline or Floating Frames with <iframes>

UNIT III CASCADING STYLE SHEETS

9 Hours

Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.

Text Books

- Jon Duckett(2015), Beginning HTML, XHTML, CSS and Java script , Wiley Publishing.

Reference Book

- Chris Bates(2016), Web ProgrammingI, 3d Edition ,Wiley Publishing.
- M. Srinivasan(2014), Web Technology: Theory and Practicel, Pearson Publication
- G. Ramanan; J. Albunskuba;S.Moovendhan(2012), Web Technology,, Charulatha Publications Private Limited

COURSE OUTCOME:

COs	On the successful completion of the course, students will be able to	Blooms Level
CO1	Understand the structure of the documents in Web.	K1,K2
CO2	Remember and understand the table handling tags.	K3
CO3	Examine and organize CSS.	K4
CO4	Implement scripts in web page.	K5
CO5	Evaluate script objects.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	2
CO2	2	2	3	3	3	2
CO3	2	3	2	2	2	2
CO4	3	2	3	3	2	3
CO5	2	2	3	2	2	2

HIGH CORRELATION 50% MODERATECORRELATION –50% LOW CORRELATION -Nil

WEB APPLICATION DEVELOPMENT_PRACTICALS UCAS302

Semester :III
Category :Selfstudy
Class& Major:II BCA

Credit 1
Hour/Week : 2
TotalHour 26

COURSE OBJECTIVES

COs	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Impart Practical Training in Control panel tools.
CO3	Familiarize with HTML Tags
CO4	Build programs using Java script.
CO5	Provide knowledge on working with events and methods

LIST OF PROGRAMS

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function).

6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
 - i. (a)The first multiple choice list, displays the Major dishes available.
 - ii. (b)The second multiple choice list, displays the Starters available.
 - iii. (c)The single choice list, displays the Soft drinks available

COURSE OUTCOME:

COs	On the successful completion of the course, students will be able to	Bloom's Level
CO1	Design and develop an HTML form with Basic tools	K1,K2
CO2	Practice the usage of web page creation and useable objects.	K3
CO3	Apply various effects on webpage.	K4
CO4	Analysis the use of java script and html code.	K5
CO5	Understand the user-defined functions and implement in Java script.	K6

CO - PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	2
CO2	3	2	2	3	2	3
CO3	3	3	2	2	2	3
CO4	3	2	3	3	2	3
CO5	2	2	3	2	2	2

HIGH CORRELATION - 50% MODERATE CORRELATION - 50% LOW CORRELATION -NIL

**COMPUTER GRAPHICS
UCAS401**

Semester : IV
Category : self study paper
Class &Major : II BCA

Credit : 1
Hour/Week : 2
Total Hour : 26

LEARNING OBJECTIVES:

Co no.	To Enable The Students
CO1	Understand the fundamentals about Computer Graphics.
CO2	Utilize the graphics methods with Scanners and I/O devices.
CO3	Analyze the 2D Transformations and clipping operations.
CO4	Apply the 3d transformations and viewing

CO5	Discuss the various methods used for detecting the visible surface
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UNIT I INTRODUCTION

5 Hours

Overview of graphics Systems: Video Display Device – Refresh Cathode-Ray tubes Raster – Scan Displays Random – Scan Displays – Color CRT Monitors –Direct view Storage tubes Flat – Panel Displays Three – Dimensional Viewing Devices. Stereoscopic and Virtual – Reality Systems.

UNIT II DEVICES AND ALGORITHMS

8 Hours

Raster – Scan Systems Video Controller – Random – Scan Systems Video Controller – Random-Scan Systems – Input device – Keyboard Mouse – Trackball and Space ball . Joysticks – Data Glove – Digitizers- Image Scanners – Touch Panels – Light pens. Voice Systems – Hard-Copy Devices – Line Drawing Algorithms DDA Algorithms – Circle generating Algorithm Properties of Ellipses.

UNIT III 2D TRANSFORMATIONS

9 Hours

Two Dimensional Geometric Transformation: Basic Transformations - Translation – Rotation – Scaling – Matrix Representations and Homogeneous Coordinates – Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping.

Text books

- Donald D. Hearn & M. Pauline Baker (2005), “Computer Graphics, C version” 2nd Edition, Pearson Education, New Delhi.

Reference books:

- S. Harrington (2010), “Computer Graphics- A Programming Approach”, McGraw Hill Publication, New Delhi.
- W.M.Newman and RF Sproull(2012), “Principle of Interactive Computer Graphics”, McGraw Hill Publication, New Delhi.

E RESOURCES:

- <https://www.slideshare.net/AtharvaRajiwade/computer-graphics-ppt-250124638>
- <https://aratideshmukh.files.wordpress.com/2020/07/basics-of-computer-graphics-ppt.pdf>

COURSE OUTCOMES:

CO	On completion of the course the student will be able to	Blooms Level
CO1	Understand the fundamentals about Computer Graphics.	K1,K2
CO2	Examine the graphics methods with Scanners and I/O devices.	K3
CO3	Analyze the 2D Transformations and clipping operations.	K4
CO4	Apply the 3d transformations and viewing	K5
CO5	Discuss the various methods used for detecting the visible surface	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	2
CO2	3	2	2	3	3	2
CO3	2	3	2	2	2	3
CO4	3	2	3	3	2	3
CO5	2	2	3	2	2	2

HIGH CORRELATION - 40% MODERATECORRELATION –60% LOW CORRELATION- Nil

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	III	Core V	UCAM308/ UCSM306	Microprocessor Architecture	Assignment	Simple Program Writing
	III	Core VI	UCAR309/ UCSR309	Microprocessor Architecture –Practical’s	DPA	Viva-Voce
IV	III	Core VII	UCAM408/ UCSM410	Industry Module:Java Application Prograaming	Assignment	Problem Solving
	III	Core VIII	UCAR409/ UCSR413	Java Application Prograaming-Practicals	DPA	Viva-Voce

DEPARTMENT OF BSC ARTIFICIAL INTELLIGENCE

PREAMBLE

UG : Programme Profile and Syllabi of Courses from I to II semesters along with Evaluation Components III and IV (With effect from 2024-2027 Batch Onwards)

PROGRAMME PROFILE BSC ARTIFICIAL INTELLIGENCE

PROGRAMME SPECIFIC OUTCOME

PSO.No.	Upon completion of the Programme , the students will be able to
PSO1:	Understanding of AI Fundamentals will demonstrate a deep understanding of the fundamental principles, theories, and algorithms that underpin artificial intelligence, encompassing various approaches and applications within the field.
PSO2:	Develop strong problem-solving skills and the ability to apply AI techniques to solve complex problems across various domains, including healthcare, finance, transportation, and robotics.
PSO3:	Gain hands-on experience in designing, developing, and deploying AI systems, including the integration of AI algorithms into software applications, platforms, and services.
PSO4:	Collaborate effectively with professionals from diverse disciplines, including computer science, mathematics, engineering, psychology, and business, to address real-world challenges using AI solutions.
PSO5:	Demonstrate a commitment to continuous learning and professional development in the rapidly evolving field of artificial intelligence, staying updated on new research, technologies, and best practices.
PSO6:	Develop strong communication and presentation skills, including the ability to articulate complex AI concepts and findings to both technical and non-technical audiences through written reports, oral presentations, and visualizations.

PROGRAMME PROFILE – BSC ARTIFICIAL INTELLIGENCE

Semester	Part	Category	Course Code	Course Title	Contact Hour/ Week	Credit Min/M ax
I	I	Language: Tamil/ Hindi/ French	UTAL110/ UHIL102/ UFRL102	General Tamil-I/Hindi-I/ French-I	5	3
	II	Language: English	UENL111	General English	5	3
	III	Core Courses - I	UAIM111/ UCAM111/ UCSM111	Object Oriented in Python Programming	5	4
	III	Core Courses - II	UAIR111/ UCAR112 UCSR111	Python Programming using OOPs Practical's	5	4
	III	Allied – Discipline Non-Specific Elective- I	UMAA119	Statistical Methods and their application– I	4	3
	IV	Foundation Course FC	UAIF101	Fundamentals of Artificial Intelligence	2	2
	IV	Skill Enhancemen t Course- SEC-1 (Non Major Elective)			2	2
	IV	Ability Enhancement Compulsory Course(AECC 1) - Soft Skill	USKS105	Soft Skill-1- Effective Communication	2	2
Total					30	23
	I	Language : Tamil/ Hindi/ French	UTAL210/ UHIL201/ UFRL201	General Tamil II/ Hindi-II/ French- II	5	3
	II	LE: Language	UENL211	General English	5	3
	III	Core Courses – III	UAIM208	JAVA Programming	5	4

II	III	Core Courses – IV	UAIR208	JAVA Programming –Practical	5	4
	III	Allied – Discipline Non-Specific Elective- II	UMAA225	Statistical Methods and their application – II	4	3
	IV	Skill Enhancement Course- SEC-2 (Non Major Elective)			2	2
II	IV	Skill Enhancement Course – SEC-3 (Discipline / Subject Specific)	UAID201	Design Thinking	2	2
	IV	Ability Enhancement Compulsory Course (AECC 2) Soft Skill-2	USKS203	Soft Skill-2	2	2
	III	Internship / Industrial Training	UINS202	Semester vacation 30 Hrs / Summer vacation 60 Hrs	-	-/2
	V	Extension Activity/ Physical Education/NC C				½
	VI	Value Added course				-/2
Total					30	24/29
	I	Language: Tamil/ Hindi/ French	UTAL310/ UHIL301/ UFRL301	General Tamil-III/ / Hindi-III/French-III	5	3
	II	Language: English	UENL311	General English	5	3

III	III	Core Course - V	UAIM301	Web Technology	4	4
	III	Core Course – VI	UAIR301	Web Technology-Lab	4	4
	III	Allied – Discipline Non-Specific Elective- I	UPHA304	Cognitive Science and Analytics	4	3
	IV	Skill Enhancement Course -SEC- 3(Discipline)	UAID301	Computer System Architecture	2	2
	IV	Skill Enhancement Course -SEC- 3(Entrepreneurial)	UAIU301	Data Exploration and Visualization	2	1
	IV	Ability Enhancement Compulsory Course (AECC 3) Soft Skill-3	USKS303	Soft Skill-3	2	2
	IV	Value Education		Value Education	2	2
Total					30	24
IV	I	Language: Tamil/ Hindi/ French	UTAL410/ UHIL401/ UFRL401	General Tamil-IV/ Hindi- IV/French-IV	5	3
	II	Language: English	UENL411	English	5	3
	III	Core Course - VII	UAIM408	Database Design and Management	5	4
	III	Core Course - VIII	UAIR408	Database Design and Management Lab	5	4
	III	Allied – Discipline Non-Specific Elective- I	UBAA404	Principles of Management	4	3
	IV	Online course *	UONL401	Design and Analysis of Algorithms	2	2
	IV	Skill Enhancement	UAID401		2	2
		Course – SEC-3 (Discipline / Subject Specific)				
	III	Internship / Industrial Training	UINS401		-	-/2
	IV	Ability Enhancement Compulsory Course (AECC) Soft Skill – 4	USKS403	Soft Skill-4	2	2

	V	Extension Activity/ Physical Education/NCC				-/2
	VI	Value Added course				-/2
Total					30	23/29
V	III	Core Course - IX	UAIM511	Machine Learning Techniques	5	4
	III	Core Course - X	UAIM512	Internet of Things	5	4
	III	Core Course - XI	UAIM513	Machine Learning Techniques lab	5	4
	III	Core Course - XII	UAIP502	Project with Viva voce	4	4
	III	Elective- Discipline Specific Elective – V	UAIO501	a) Artificial Neural Network b) Software Testing c) Cyber Security d) Deep Learning	5	3
	III	Elective- Discipline Specific Elective – VI	UAIO502	a)BlockChain Technology b)Cloud computing c)Agile Technology c)Bigdata Analytics	4	3
	IV	Environmental Studies			2	2
Total					30	24
VI	III	Core Course - XIII	UAIM611	Artificial Intelligence	5	4
	III	Core Course - XIV	UAIM612	Operating System concepts	5	4
	III	Core Course - XV	UAIR613	Artificial Intelligence – Practical	5	4
	III	Elective- Discipline Specific Elective – VII	UAIO601	a)Data Warehousing and Mining b)Network Security c) Robotics d)Edge and Fog Computing	6	4
	III	Elective- Discipline Specific Elective – VIII	UAIO602	a)Wireless Networks b)b)Computational Intelligence c)Sentimental Analysis d)Software Quality Analytics	5	3
		Comprehensive Viva-Voce				1
	III	Internship / Industrial Training (semester vacation 30 Hrs/)	UINS602		-	-/2
	IV	Professional Competency Skill	UAIC601	Professional Competency Skill [Competitive Examinations]	4	2
	III	Extension Activity/ Physical Education/NCC	-	-	-	-/2

	VI	Value Added Course				
				Total	30	22/26
OVERALL TOTAL					180	140/155

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Contact Hrs /week	Credit
I	Self-study Paper	UAIS101	Information Retrieval Techniques	2	1
II	Self-study Paper	UAIS201	Natural Language Processing	2	1
III	Self-study Paper	UAIS301	GPU Architecture and Programming	2	1
IV	Self-study Paper	UAIS401	Cyber Forensics	2	1
V	Self-study Paper	UAIS501	Professional Ethics in Engineering	2	1
VI	Self-study Paper	UAIS601	Wireless Adhoc and Sensor Networks	2	1

OBJECT ORIENTED IN PYTHON PROGRAMMING

UAIM111/UCAM111/UCSM111

Semester : I **Credit : 4**
Category : Major Core (DSC) - I **Hour/ Week: 5**
Class & Major : IBSCARTIFICIAL INTELLIGENCE **Total Hour: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Demonstrate a comprehensive understanding of the fundamental concepts of Python programming
CO-2	Apply control structures and Boolean expressions to develop efficient and well-structured Python programs
CO-3	Implement and utilize Python functions, including recursive functions and various parameter-passing techniques, to create modular and reusable code.
CO-4	Utilize advanced data structures such as dictionaries and sets, and apply object-oriented programming principles
CO-5	Develop Python programs for real-world applications, including file handling, database programming

UNIT - I INTRODUCTION

13 Hours

Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.

UNIT - II CONTROL STRUCTURES

13 Hours

Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges.

UNIT - III FUNCTIONS

13 Hours

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions

UNIT - IV DICTIONARIES, SETS AND OOPS

13 Hours

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. Data analysis with python

UNIT - V OBJECTS AND THEIR USE

13 Hours

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular

Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, String Processing - Exception Handling. Web frame works(e.g., Flask, Django)

Case Study: Web Programming using Python Image Processing – Facebook Analysis – Twitter Analysis

Text Books

- Oliver, R. (2023), “*Python QuickStart Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications*”, ClydeBank Media LLC.
- Charles Dierbach,(2015), “*Introduction to Computer Science using Python - A computational Problem solving Focus*”, Wiley India Edition.
- Wesley J. Chun,(2016), “*Core Python Applications Programming*”, 3rd Edition , Pearson Education.

Reference Books

- Mark Lutz (2018), “*Learning Python Powerful Object Oriented Programming*”, O’reilly Media, 5th Edition.
- Timothy A. Budd(2011), “*Exploring Python*”, Tata MCGraw Hill Education Private Limited, 1 st Edition.
- John Zelle(2013), “*Python Programming: An Introduction to Computer Science*”, Second edition, Course Technology Cengage Learning Publications, ISBN 978- 1590282410
- Michel Dawson(2013), “*Python Programming for Absolute Beginners*” , Third Edition, Course Technology Cengage Learning Publications, ISBN 978-1435455009

e-Resource

1. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
2. [Python - Object Oriented | Tutorialspoint](#)
3. [Corey Schafer - YouTube](#)

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom’s Level
CO-1	Understand and apply core Python programming concepts, including OOP principles, to AI applications.	K1

CO-2	Develop Python programs that utilize libraries for data analysis.	K2
CO-3	Implement algorithms for data manipulation and representation, essential for AI tasks.	K3
CO-4	Design and develop modular Python applications that integrate AI solutions across various domains.	K4, K5
CO-5	Effectively communicate AI-related concepts and findings through Programming projects and presentations.	K6

CO - PSO

MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

PYTHON PROGRAMMING USING OOPS PRACTICAL'S

UAIR111/UCAR112/UCSR111

Semester :I Credit : 4

Category : Major Core (DSC) – II Hour/Week : 5

Class & Major : I BSC ARTIFICIAL INTELLIGENCE Total Hour :65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire programming skills in core Python.
CO-2	Acquire Object-oriented programming skills in Python
CO-3	Develop the skill of designing graphical-user interfaces (GUI) in Python.
CO-4	Develop the ability to write database applications in Python.
CO-5	Acquire Python programming skills to move into specific branches

List of Programs:

1. All kinds of Data types.
2. Operators
3. Decision Making

4. Looping
5. Functions
 - a. Calling Value-Returning Functions
 - b. Calling Non-Value-Returning Functions
 - c. Recursive Functions
6. Dictionaries', List, tuples and sets.
7. Object Oriented Programming
 - a. Class
 - b. Constructor
 - c. Polymorphism
 - d. Inheritance
8. Files.
9. Exception Handling
10. Database programming.

Text Books:

- Oliver, R. (2023), “*Python QuickStart Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications*”, ClydeBank Media LLC.
- Charles Dierbach(2015), “*Introduction to Computer Science using Python - A computational Problem solving Focus*”, Wiley India Edition.
- Wesley J. Chun(2016), “*Core Python Applications Programming*”, 3rd Edition , Pearson Education.

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- Timothy A. Budd(2011), “*Exploring Python*”, Tata MCGraw Hill Education Private Limited , 1 st Edition.
- John Zelle(2013), “*Python Programming: An Introduction to Computer Science*”, Second edition, Course Technology Cengage Learning Publications, ISBN 978-1590282410
- Michel Dawson(2013), “*Python Programming for Absolute Beginners*” , Third Edition, Course Technology Cengage Learning Publications, ISBN 978-1435455009

e- Resources:

- <https://dabeaz-course.github.io/practical-python/Notes/Contents.html>
- <https://itvoyagers.in/best-python-programming-practicals-for-beginners/>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Remember and understand the fundamental concepts of core Python programming, including data types, operators, decision-making, and looping structures.	K1,k2
CO-2	Apply object-oriented programming principles in Python, such as classes, constructors, polymorphism, and inheritance, to develop modular and reusable code.	K3
CO-3	Analyze and design graphical user interfaces (GUIs) using Python to enhance the interactivity and user experience of applications.	K4
CO-4	Evaluate and construct database applications within Python, demonstrating the ability to perform CRUD (Create, Read, Update, Delete) operations.	K5
CO-5	Create advanced Python applications in areas such as web development, data analysis, and network programming, demonstrating the ability to adapt to new technologies and solve real-world problems.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	1	1	3
CO2	3	3	2	2	1	2
CO3	2	3	3	2	3	2
CO4	3	3	3	3	2	3
CO5	3	3	3	3	3	3

High Correlation – 63.33% Moderate Correlation – 26.6 % Low Correlation – 10%

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

UAIF101

Semester	: I	Credit	: 2
Category	: Foundation Course	Hour/Week	: 2
Class & Major	: I B.Sc ARTIFICIAL INTELLIGENCE	Total Hour	: 26

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the basics of Artificial Intelligence.
CO-2	Improve problem solving techniques, knowledge representation and

	reasoning systems capability.
CO-3	Gain knowledge on emergent an Intelligent agent.
CO-4	Investigate applications of AI techniques in Intelligent Agents, Expert systems.
CO-5	Explore the current scope, potential, limitations, and implications of AI Based systems.

UNIT – I INTRODUCTION & INTELLIGENT AGENTS 6 Hours

Foundations of AI: The History of Artificial Intelligence - The State of the Art - Risks and Benefits of AI. Agent and Environment: The Concept of Rationality - The Nature of Environments - The Structure of Agents.

UNIT – II PROBLEM SOLVING 5 Hours

Solving problems by searching - Uninformed search - BFS, DFS, Uniform cost search Informed Search - Best First search, A* search, Local search - Hill climbing, Two player games.

UNIT – III REASONING 5 Hours

Propositional Logic - Reasoning using First order logic - Forward and backward reasoning - Unification - Resolution.

UNIT – IV KNOWLEDGE REPRESENTATION 4 Hours

Knowledge based Agents - Agents based Propositional Logic - Categories and Objects - Events - Semantic net - Reasoning in Semantic Net.

UNIT – V UNCERTAINTY- PROBABILISTIC REASONING 6 Hours

Prior and Posterior Probabilities - Bayes' Theorem - Bayesian Network - Probabilistic reasoning over time - Inference in temporal model - Hidden Markov Model.

Text Books

- Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2020.
- Dan W Patterson, Introduction to Artificial Intelligence and Expert Systems, 1st Edition, PHI, 2015.

Reference Books

- Stuart J. Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Third Edition, PHI, 2015.
- Elaine Rich and Kevin Knight, Artificial Intelligence, Third Edition, Tata McGraw Hill, 2008.

e-Resources

- [e-PGPathshala \(inflibnet.ac.in\)](http://e-PGPathshala (inflibnet.ac.in))
- [Fundamentals of Artificial intelligence - Course \(nptel.ac.in\)](http://Fundamentals of Artificial intelligence - Course (nptel.ac.in))
- <https://cse22-iiith.vlabs.ac.in>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Learn various Artificial Intelligence techniques and their areas of applications.	K1, K2
CO-2	Understand the problem space and searching methods.	K3
CO-3	Analyze knowledge representation using logic and rules.	K4
CO-4	Enhance the reasoning ability using Predicate Logic.	K5
CO-5	Apply decision making strategies under uncertainties.	K6

JAVA PROGRAMMING

UAIM208

Semester	: II	Credit	4
Category	: Major Core (DSC) - III	Hour/Week	5
Class & Major	: IBSC ARTIFICIAL INTELLIGENCE	Total Hour	65

COURSE OBJECTIVES

C.NO.	To enable the students
CO1	Understand and Utilize Basic Data Types and Operators
CO2	Implement Object-Oriented Programming Concepts
CO3	Develop and Manage Packages and Multithreaded Applications
CO4	Create and Manage Applets with Event Handling
CO5	Utilize AWT for Graphical User Interface Development

UNIT I INTRODUCTION

13 Hours

Data Types, Variables and Arrays: Primary types – Integers – Floating point types – Characters – Booleans – Literals – Variables – Type Conversion and Casting – Automatic type Promotion in Expressions - One Dimensional Arrays– Multi Dimensional Arrays. Operators: Arithmetic Operators – Bitwise operators – Relational Operators – Boolean Logical Operators – Assignment Operator – Conditional Operator – Operator Precedence- Using parentheses.

UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS

13 Hours

Class Fundamentals – Declaring objects- Assigning object Reference variables- Introducing Methods- Constructors-Garbage collection – Finalize() Method A Closer Look at Methods and classes: Overloading Methods-Using objects as parametersArgument passing – Returning objects- Recursion-Introducing Access control – understanding static –Introducing

final– Nested and Inner classes- String class- Using command line arguments. Inheritance: Inheritance Basics –Using super- creating Multilevel Hierarchy - Method overriding – Dynamic Method Dispatch –Using Abstract class –Using final with inheritance- The object class.

UNIT III PACKAGES AND THREADS

13 Hours

Packages –Access Protection –Importing packages-Interfaces. Exception Handling: Introduction- Exception Types – Uncaught Exceptions- Using try and catch – Multiple catch clauses –Nested try statements- throw – throws-finally. Multithreaded programming : Java Thread Model –Main Thread –Creating a Thread –Creating Multiple Threads – Using is Alive() and join() –Thread priorities

UNIT IV APPLETS

13 Hours

Applet Basics – Applet Architecture –Applet Skeleton- Applet Display method – Requesting Repainting – HTML APPLET tag- Passing Parameters to Applet. Event Handling: Event Handling Mechanisms –Delegation Event Model –Event classes(The Action Event ,Item Event , Key Event, Mouse Event) – Sources of Events - Event Listener Interfaces(Action Listener, Item Listener, Key Listener, Mouse Listener).

UNIT V INTRODUCTION TO AWT

13 Hours

AWT Classes – Window fundamentals – working with Frame Windows –working with Graphics– Working with color – Working with Fonts. Using AWT Controls: Controls Fundamentals – Labels – Using Buttons –Applying check Boxes – Check Box group – Choice Controls – Using a Text field – Using a Text Area – Understanding Layout Managers [Flow Layout Only] – Menu Bars and Menus.

Text Books

- Herbert Schildt(2022), “*Java - The Complete Reference*”, Twelfth Edition, McGrawHill Education.

Reference books

- E. Balagurusamy(2014), “*Programming with Java*”, Tata McGraw-Hill Education India.
- Sachin Malhotra &Saurabh Choudhary(2015), “*Programming in JAVA*”,2nd Ed,

Web Resources

- <http://developer.java.sun.com>
- javatutorial-w3schools
- learn java programming-javatpoint

COURSE OUTCOMES

CO	On completion of the course the student will be able to	Bloom's level
CO1	Comprehend the basics of programming, including variables, conditional statements, iterative execution, and methods.	K1,K2
CO2	Understand and apply the principles of object-oriented programming in Java, such as defining classes, invoking methods, and utilizing class libraries.	K3
CO3	Explore and analyze key topics and principles related to software development.	K4
CO4	Develop the skills to write computer programs that address specified problems	K5
CO5	Utilize the Java SDK to create, debug, and execute simple Java programs.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	2	2
CO2	3	3	3	2	3	2
CO3	3	2	3	2	2	3
CO4	3	3	3	2	3	3
CO5	3	3	3	3	3	3

High Correlation – 63.33% Moderate Correlation – 36.6 % Low Correlation – 0%

JAVA PROGRAMMING- LAB

UAIR208

Semester : II **Credit : 4**
Category : Major Core (DSC) - IV **Hour/Week : 5**
Class & Major : I BSc Artificial Intelligence **Total Hour : 65**

COURSE OBJECTIVES

C.NO.	To enable the students
CO1	Implement Object-Oriented Programming Concepts
CO2	Design and Develop Graphical User Interfaces
CO3	Build and Deploy Applets and Applications
CO4	Handle Exceptions and Implement Multi-Threading
CO5	Integrate Networking, I/O Streams, and Database Connectivity

List of Programs

1. Implementation of Classes and Objects

2. Implementation of Inheritance and Polymorphism
3. Implementation of Interface and Package concepts
4. Implementation of Flow, Border ,Grid Layouts
5. Implementation of Tic-Tac Toe Application Using Applets
6. Implementation of Frames, Menus, Dialog
7. Implementation of Swing concepts
8. Implementation of Exception Handling
9. Implementation of Multi Threading
10. Implementation of I/O Streams
11. Implementation of Java Networking concepts
12. Implementation of Java Servlets (Connecting Database)
13. Implementation of RMI
14. Implementation of Java Beans

COURSE OUTCOMES

CO	On completion of the course the student will be able to	Bloom's level
CO1	Understand the fundamentals of programming and develop small to medium-sized application programs that demonstrate professionally acceptable coding standards	K1,K2
CO2	Apply the principles of object-oriented programming through Java	K3
CO3	Analyze the concepts of inheritance, modularity, concurrency, exception handling, and data persistence to develop robust Java programs.	K4
CO4	Evaluate and implement Java programs for applets and graphics programming.	K5
CO5	Design and develop applications using fundamental concepts of AWT controls, layouts, and event handling in Java.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	2
CO2	3	3	3	2	2	2
CO3	3	3	3	2	2	2
CO4	3	3	3	2	3	3
CO5	3	3	3	2	3	3

High Correlation – 63.33% Moderate Correlation – 36.6 % Low Correlation -0%

DESIGN THINKING

UAID201

Semester	: II	Credit	4
Category	: Skill Enhancement Course – SEC-3 (Discipline)	Hour/Week	5
Class & Major	: IBSC ARTIFICIAL INTELLIGENCE	Total Hour	65

COURSE OBJECTIVES

C.NO.	To enable the students
CO1	Apply Design Thinking Principles
CO2	Employ Empathetic Research and Define Problems
CO3	Generate and Evaluate Ideas
CO4	Implement and Test Design Solutions
CO5	Integrate Design Thinking in Future Contexts

UNIT I INTRODUCTION 13 Hours

Problem statement-Design principal – Ask 5x why – story telling- context mapping- critical item diagram- The process of Design Thinking - How to plan a Design Thinking project.

UNIT II UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM 13 Hours

Search field determination - Problem clarification - Understanding of the problem - Problem 57 analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.

UNIT III IDEATION AND PROTOTYPING 13 Hours

Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.

UNIT IV TESTING AND IMPLEMENTATION 13 Hours

Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.

UNIT V DESIGN FOR FUTURE 13 Hours

Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.

Case Study:

1. Using ‘Design Thinking’ to Enhance Urban Redevelopment.
2. Explain the impact of design thinking on innovation
3. How to Stimulate Innovation in Your Organization With Design Thinking
4. Can Design Thinking help you solve your own problems? (Applying Design Thinking Internally)
5. B2B Design Thinking: Product Innovation when the User is a Network

Text Books

- Lewrick, M., Link, P., & Leifer, L. (2020), “*The design thinking toolbox: A guide to mastering the most popular and valuable innovation methods*”. John Wiley & Sons
- Christian Mueller-Roterberg(2015),”*Handbook of Design Thinking - Tips & Tools for how to design thinking*”. McGrawHill Education.
- Jeanne Liedtka and Tim Ogilvie(2016).”*Designing for Growth: a design thinking tool kit for managers*”, By Jeanne Liedtka and Tim Ogilvie.
- Tim Brown(2017),”*Change by Design: How Design Thinking Transforms Organizations and Inspires*”, Harvard Business Press .

Reference books

- Johnny Schneider (2017), “Understanding Design Thinking, Lean and Agile”, O’Reilly Media.
- Roger Martin (2019), "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press .
- Hasso Plattner, Christoph Meinel and Larry Leifer (eds) (2011), "Design Thinking: Understand – Improve – Apply", Springer.

E- Resources

- http://developer.Design_Thinking.sun.com
- <http://ajjuliani.com/design-thinking-activities/>
- <https://venturewell.org/class-exercises>

COURSE OUTCOMES

C.No	On completion of the course the student will be able to	Bloom’s level
CO1	Understand the importance of prioritizing the needs, desires, and experiences of end-users in the design process.	K1,K2
CO2	Define and comprehend the problem space holistically before generating solutions, including reframing challenges to uncover deeper insights	K2
CO3	Promote and engage in multidisciplinary collaboration and teamwork to leverage diverse perspectives and expertise for comprehensive solutions.	K3

CO4	Encourage a bias towards action and experimentation rather than prolonged analysis, learning through doing.	K5
CO5	Design and implement innovative solutions that have a meaningful impact on people's lives, demonstrating advanced problem-solving skills and adaptability to emerging trends in design thinking.	K5,K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	3
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	2	3	3	3	2
CO5	3	2	2	3	3	3

High Correlation – 60.0% Moderate Correlation – 40.0 % Low Correlation -0%

INFORMATION RETRIEVAL TECHNIQUES

UAIS101

Semester	: I	Credit	:1
Category	: Self study paper	Hour/Week	:2
Class &Major	: I BSC ARTIFICIAL INTELLIGENC	Total Hour	:26

LEARNING OBJECTIVES:

Co no.	To Enable The Students
CO1	Comprehend the Fundamentals of Information Retrieval Systems
CO2	Apply and Evaluate Information Retrieval Models
CO3	Utilize Classification and Clustering Techniques in Text Retrieval
CO4	Design and Optimize Search Interfaces
CO5	Conduct and Apply Research in Information Retrieval

UNIT I INTRODUCTION

8 Hours

Information Retrieval – Information versus Data Retrieval – IR vs information extraction- components of IR – context search – conceptual search - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

UNIT II MODELING AND RETRIEVAL EVALUATION

9 Hours

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

UNIT III TEXT CLASSIFICATION AND CLUSTERING

9 Hours

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing..

Text books

- Latha, K. (2017), *Experiment and Evaluation in Information Retrieval Models*, second edition, Chapman and Hall/CRC,
- Ricardo Baeza-Yates and Berthier Ribeiro-Neto(2011), "Modern Information Retrieval: The Concepts and Technology behind Search", Second Edition, ACM Press Books.
- Ricci, F, Rokach, L. Shapira, B.Kantor (2011), "Recommender Systems Handbook", First Edition .

Reference books:

- C. Manning, P. Raghavan, and H. Schütze, (2018), "Introduction to Information Retrieval", Cambridge University Press.
- 2. Stefan Buettcher, Charles L. A. Clarke and Gordon Cormack(2010),"Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press.

e-RESOURCES:

- [https://www.slideshare.net/AtharvaRajiwade/ INFORMATION RETRIEVAL TECHNIQUES -ppt-250124638](https://www.slideshare.net/AtharvaRajiwade/INFORMATION_RETRIEVAL_TECHNIQUES_-ppt-250124638)
- [INFORMATION RETRIEVAL TECHNIQUES - ppt.pdf](#)

COURSE OUTCOMES:

CO	On completion of the course the student will be able to	Bloom's Level
CO1	Understand the foundational concepts and principles of information retrieval, including indexing, querying, relevance, and retrieval models.	K1, K2
CO2	Explain and apply various information retrieval models, such as Boolean, vector space, probabilistic, and language models, to effectively retrieve relevant information from text	K3

	collections.	
CO3	Acquire skills to design and implement efficient indexing systems for large document collections, utilizing techniques like inverted indexing and compression.	K4
CO4	Demonstrate proficiency in processing user queries efficiently through techniques like query parsing, query expansion, and optimization for enhanced retrieval performance.	K5
CO5	Evaluate the effectiveness of information retrieval systems using key metrics, including precision, recall, F1-score, mean average precision (MAP), and normalized discounted cumulative gain (NDCG).	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	2	2
CO4	3	2	3	3	3	2
CO5	3	3	3	3	2	3

High Correlation – 63.3% Moderate Correlation – 36.67 % Low Correlation -0%

NATURAL LANGUAGE PROCESSING

UAIS201

Semester :II Credit : 1
Hour/Week : 2
Category :Self study paper
Class &Major :IBSC ARTIFICIAL INTELLIGENCE Total Hour : 26

LEARNING OBJECTIVES:

Co no.	To Enable The Students
CO1	Understand Core Concepts in Speech and Language Processing
CO2	Apply Models and Algorithms for Speech Processing
CO3	Analyze and Address Issues in Speech Modelling
CO4	Utilize Phonetics and Signal Processing Techniques
CO5	Develop and Assess Phonetic Resources and Tools

UNIT I INTRODUCTION

8 Hours

Introduction – NLP task - models and algorithms - N grams, -Probabilistic model for text

classification – vector space.

UNIT II SPEECH MODELLING

9 Hours

Word classes and part of speech tagging – hidden markov model – computing likelihood: the forward algorithm – training hidden markov model – maximum entropy model – transformation based tagging – evaluation and error analysis – issues in part of speech tagging – noisy channel model for spelling, Sequence Labeling and Conditional Random Fields (CRFs)

UNIT III SPEECH PRONUNCIATION AND SIGNAL PROCESSING

9 Hours

Phonetics - speech sounds and phonetic transcription - articulatory phonetics - phonological categories and pronunciation variation - acoustic phonetics and signals - phonetic resources - articulatory and gestural phonology, Speech Synthesis and Text-to-Speech Systems

Text books

- Yue Zhang. (2021), “*Natural language processing a machine learning perspective*”, Cambridge University Press
- Daniel Jurafsky and James H. Martin (2013), “*Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*”, Person education

Reference Books

- .Kai-Fu Lee (2019), “*Automatic Speech Recognition*”, The Springer International Series in Engineering and Computer Science.
- Himanshu Chaurasiya (2010), “*Soft Computing Implementation of Automatic Speech Recognition*”, LAP Lambert Academic Publishing.

e-RESOURCES:

- <https://www.slideshare.net/AtharvaRajiwade/SPEECH-PROCESSING-ppt-250124638>
- Speech Processing - ppt.pdf

COURSE OUTCOMES:

CO	On completion of the course the student will be able to	Blooms Level
CO1	Understand the fundamental principles and components of speech processing, including speech production, transmission, and perception.	K1, K2
CO2	Analyze speech signals using various methods, including time-domain and frequency-domain analysis, spectrogram analysis, and feature extraction techniques.	K3
CO3	Explore the algorithms and principles behind automatic speech recognition (ASR) systems, including hidden Markov models (HMMs), deep neural networks (DNNs),	K4

	and recurrent neural networks (RNNs).	
CO4	Apply theoretical concepts through hands-on exercises and projects using software tools and programming languages such as Python, MATLAB, and specialized speech processing libraries.	K5
CO5	Investigate current research trends and emerging technologies in speech processing, fostering critical thinking and innovation in the field.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	2	2
CO4	3	2	3	3	3	2
CO5	3	3	3	3	2	3

High Correlation – 63.7% Moderate Correlation – 36.3 % Low Correlation -0%

III AND IV EVALUATION OF COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Core Course- I	UAIM111/ UCAM111/ UCSM111	Object Oriented Programming in Python	Assignment	Poster Design
	Core Course- II	UAIR111/ UCAR112 UCSR111	OOPs with Python Programming Practical's	DPA	Viva-voce
	Foundation Course(FC)	UAIF101	Fundamentals of Artificial Intelligence	Working Model	Poster Design
II	Core Course- III	UAIM208	JAVA Programming	Problem Solving	Poster Design
	Core Course- IV	UAIR208	JAVA Programming - Practical	DPA	Viva-voce
	Foundation Course	UAID201	Design Thinking	Case Study	Poster Design

DEPARTMENT OF COMPUTER SCIENCE

PREAMBLE

UG : Programme Profile and Syllabi of Courses from I to II semesters along with Evaluation Components III and IV (With effect from 2024-2027 Batch Onwards)

PROGRAMME PROFILE B.Sc CYBER SECURITY

PROGRAMME SPECIFIC OUTCOME

PSO 1	Apply the knowledge of computer systems, networking, data systems and cyber security specializations to the solution of complex cyber security problems.
PSO 2	Identify, formulate, review and research design solutions for complex cyber security problems and design security components or processes to meet the specified needs with appropriate consideration for the public and private data security and the cultural, societal and environmental considerations.
PSO 3	Create, select and apply techniques, resources and modern cyber security tools and techniques to assess societal ,health, safety ,legal and cultural issues and the consequent responsibilities relevant to the professional cyber security service
PSO 4	Apply ethical principles and commit to professional ethics and responsibilities and norms of the cyber security practice as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PSO 5	Communicate effectively on complex cyber security activities with the cyber security & IT community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations.
PSO 6	Conduct as a Responsible citizen by recognizing the human role in security system with an emphasis on Ethic, Social Engineering Vulnerabilities

PROGRAMME PROFILE - B.Sc CYBER SECURITY

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit Min/Max
I	I	Language : Tamil / Hindi /French	UTAL110 / UHIL102 /UFRL102	General Tamil-I/ Hindi-I /French-I	5	3
	II	Language : English	UENL111	General English	5	3
	III	Core Courses - I	UCYM101	Data Structures	5	4
	III	Core Courses - II	UCYR101	Data Structures- Lab	5	4

	III	Elective Course 1)Generic / Discipline Specific(	UMAA125	Mathematics for Computer Science-I	4	3
	IV	Foundation Course FC	UCYF101	Fundamentals of Cyber Security	2	2
	IV	Skill Enhancement Course –SEC-1)Non Major Elective(			2	2
	IV	Ability Enhancement Compulsory Course)AECC 1- (Soft Skill	USKS104	Soft Skill-1 -Effective Communication	2	2
Total					30	23
II	I	Language : Tamil /Hindi / French	UHIL201/UFRL201	General Tamil II/ Hindi-II /French-II	5	3
	II	LE :Language	UENL211	General English	5	3
	III	Core Courses - III	UCYM201	Programming in Python	5	4
	III	Core Courses - IV	UCYR201	Programming in Python Lab	5	4
	III	Elective Course –II)Generic / Discipline Specific(	UMAA226	Mathematical for Computer Science-II	4	3
	IV	Skill Enhancement Course –SEC-3)Discipline / Subject Specific(	UCYD201	Operating Systems	2	2
	IV	Skill Enhancement Course –SEC-1)Non Major Elective(			2	2
	IV	Ability Enhancement Compulsory Course)AECC 2 (Soft Skill-2	USKS203	Soft Skill-2	2	2
	III	Internship / Industrial Training	UINS201	Internship /Industrial Training		/-2
	V	Extension Activity / Physical Education /NCC				½
	VI	Value added courses)Outside class	CCSC201			/-2

		hours(
Total					30	24/29
III	I	Language : Tamil /Hindi / French	UTAL310 / UHIL301/UFRL301	General Tamil-III /Hindi-III / French-III	5	3
	II	Language : English	UENL311	General English	5	3
	III	Core Course - V	UCYM301	Object oriented Programming in java	4	4
	III	Core Course – VI	UCYR301	Object oriented Programming in java-Lab	4	4
	III	Elective Course 3)Generic / Discipline Specific- (EC3	UMAA306	Discrete Mathematical Structures	4	3
	IV	Skill Enhancement Course -SEC-5)Discipline Specific / Generic(	UCYD301	Computer Networks	2	2
	IV	Skill Enhancement Course -SEC-4)Entrepreneurial Based(	UCSU311	Cyber Threats and Modelling	2	1
	IV	Ability Enhancement Compulsory Course)AECC 3 (Soft Skill-3	USKS301	Soft Skill-3	2	2
	IV	Value Education	UGEV301	Value Education	2	2
Total					30	24
IV	I	Language : Tamil / Hindi/French	UTAL409/ UTAL410	General Tamil IV / Hindi-II /French-II	5	3
	II	Language : English	UENL410	General English	5	3
	III	Core Course - VII	UCYM401	Industry Module :Tools and Techniques for Cyber Security	5	4
	III	Core Course – VIII	UCYR401	Cyber Security – Lab	5	4
	III	Elective Course -EC4)Generic (	UMAA404	Statistical Analysis using R	4	3
	IV	Skill Enhancement Course –SEC-6)Discipline Specific(	UCYD401	Network Security	2	2
	IV	Skill Enhancement Course-Online course	UONL401	Online Course *	2	2

	IV	Ability Enhancement Compulsory Course)AECC 4 (Soft Skill-4	USKS401	Soft Skill-4	2	2
	IV	Internship / Industrial Training	UINS401	Internship /Industrial Training	-	/-2
	V	Extension Activity / Physical Education/NCC			-	/-2
	VI	Value added course)Outside class hours(	VCSC401		-	/-2
Total					30	23/29
V	III	Core Course – IX	UCYM501	Ethical Hacking	5	4
	III	Core Course –X	UCYM502	Cyber Crimes and Mitigation Techniques	5	4
	III	Core Course – XI	UCYR501	Ethical Hacking Lab	5	4
	III	Elective Course –EC5)Generic /Discipline Specific(	UCYD501 UCYD502 UCYD503	1.System Control Softwares 2 .IOT Security Measures 3.Linux Kernel	5	3
	III	Elective Course –EC6)Generic /Discipline Specific(	UCYD504 UCYD505 UCYD506	1.Web and information Security 2 .Cryptography for cyber Security 3 .Artificial Neural Networks	4	3
	III	Core Course - XII	UCYP502	Project with Viva voce	4	4
	IV	Environmental Studies	UGEV501	Environmental studies	2	2
Total					30	24
VI	III	Core Course - XIII	UCYM616	Security in Computing	5	4
	III	Core Course – XIV	UCYM617	Cloud Security	5	4
	III	Core Course – XV	USYR610	Cloud Security Lab	5	4
	III	Elective Course –EC7)Generic /Discipline Specific(	UCYD601/ UCYD602/ UCYD603	1. Cyber Policy and Defense Techniques 2 .Machine Learning Techniques 3 .Parallel Processing	6	4
	III	Elective Course –EC8)Generic /Discipline Specific(	UCYD604/UCYD605/ UCYD606/	1 .Block Chain Technology 2. Mobile Networks 3.Social Media Analytics	5	3
	III	Comprehensive			-	1

		Viva-voce				
	IV	Professional Competency Skill Enhancement Course SEC8	UCYC601	Professional Competency	4	2
	III	Internship / Industrial Training)semester vacation 30 Hrs(	UINS601	Internship /Industrial Training	-	/-2
	V	Extension Activity / Physical Education/NCC			-	/-2
	VI	VALUE ADD COURSE			-	-
Total					30	22/26
OVERALL TOTAL					180	140/155

NON MAJOR ELECTIVE

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Skill Enhancement Course)Non Major Elective(	UCSE101 / UITE101/UCAE101/UCYE101	Office Automation	2	2
II	Skill Enhancement Course -SEC-2)Non Major Elective(	UCSE211 / UITSE211 / UCAE211 / UCYE201	Advanced Excel	2	2

EXTRA CREDIT EARNING PROVISION

SELF STUDY

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Self-study Paper	UCYS101/ UCSS102/ UCYS102	Essentials of Cyber Security Desktop Publishing	2	1
II	Self-study Paper	UCYS201/ UCSS202/ UCYS202	Digital Forensics Hardware Trouble Shooting	2	1
III	Self-study Paper	UCYS301/ UCYS302	Electronic Payment System Risk management	2	1
IV	Self-study Paper	UCSS401 / UCYS401/ UCYS402	Mobile Adhoc Networks Devops	2	1
V	Self-study Paper	UCYS501/ UCSS502 / UCYS502	Open Source Technology Natural Language Processing	2	1
VI	Self-study Paper	UCYS601/ UCSS602 / UCYS602	Security Issues in Data Processing Computational Intelligence	2	1

DATA STRUCTURES
UCYM101

Semester : II

Credit : 4

Category : Major Core (DSC) - I

Hours/Week : 5

Class & Major: I B.SC Cyber Security

Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand fundamental data structures and their complexities, including arrays, linked lists, stacks, queues, trees, and graphs.
CO-2	Apply operations and algorithms on various data structures, such as insertion, deletion, searching, and traversing in arrays, linked lists, stacks, queues, and trees.
CO-3	Analyze the efficiency and functionality of different data structures and algorithms, including their time and space complexity, and their suitability for various applications.
CO-4	Evaluate and compare searching and sorting algorithms, including linear search, binary search, and various sorting methods, based on their performance and application scenarios.
CO-5	Create effective algorithms and data structures for solving complex problems, integrating concepts from stacks, queues, trees, and graphs to design efficient and scalable solutions.

UNIT - I INTRODUCTION TO DATA STRUCTURES

13 Hours

Data Structures: Definition- Time & Space Complexity-Arrays: Representation of arrays, Applications of arrays, sparse matrix and its Representation-Linear list: Singly linked list implementation, insertion, and deletion and searching operations on linear list - Circular linked list: implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists- Dynamic Storage management.

UNIT - II STACKS

13 Hours

Inheritance: Operations, array and linked representations of stack- stack applications, infix to postfix conversion, postfix expression evaluation, recursion implementation

UNIT - III QUEUES, TREES

13 Hours

Queues: operations on queues, array and linked representations- Circular Queue: operations, applications of queues. Trees: Definitions and Concepts- Representation of binary tree, Binary tree traversals (Inorder, Postorder, preorder)- Binary search trees - AVL Trees and balanced Search tree.

UNIT - IV GRAPHS

13 Hours

Graphs: Representation of Graphs- Types of graphs -Graph Traversal-Breadth first traversal -

Depth first traversal- -Applications of graphs.

UNIT - V SEARCHING AND SORTING

13 Hours

Searching and Sorting - Searching-linear and binary search methods Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort comparison of sorting and searching methods.

Text Books

- Seymour Lipschutz (2022), "Data Structures with C", First Edition, Schaum's outline series in computers, Tata McGraw Hill.
- E. Horowitz, S. Sahni and S. Rajasekaran (2022), Second Edition, "Fundamentals of Computer Algorithms" Universities Press.

Reference Books

- Seymour Lipschutz (2022), "Data Structures with C", First Edition, Schaum's outline series in computers, Tata McGraw Hill.
- R.Krishnamoorthy and G.Indirani Kumaravel (2008), "Data Structures using C", Tata McGrawHill .
- A.K.Sharma (2011), "Data Structures using C", Pearson Education India.
- G. Brassard and P. Bratley (1997), "Fundamentals of Algorithms", PHI, New Delhi.
- Ellis Horowitz (1993), Sartaj Sahni, Susan Anderson Freed, Second Edition, "Fundamentals of Data in C", Universities Press.
- Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein (2009), "Introduction to Algorithms", Third edition, MIT Press.
- Sanjoy Dasgupta, C.Papadimitriou and U.Vazirani (2008), "Algorithms ", Tata McGraw-Hill.

e-Resource

- https://gurukpo.com/Content/BCA/Data_structure_and_Algorithm.pdf
- <https://www.youtube.com/watch?v=EmH29ylz-Z8>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Recall fundamental concepts of data structures, including arrays, linked lists, stacks, queues, trees, and graphs, and Explain the time and space complexity of various data structures and operations, and describe their applications.	K1,K2

CO-2	Implement and perform operations on arrays, linked lists, stacks, and queues, including insertion, deletion, and searching.	K3
CO-3	Analyze and compare different tree structures, including binary trees, binary search trees, AVL trees, and balanced search trees, and their traversal methods.	K4
CO-4	Evaluate and compare various searching and sorting algorithms, including linear search, binary search, and different sorting techniques based on their efficiency and application.	K5
CO-5	Design and develop algorithms and data structures for solving complex problems, integrating concepts from stacks, queues, trees, and graphs.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	1	2	2
CO2	3	3	2	1	3	2
CO3	3	3	3	2	2	2
CO4	2	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation - 56.6% Moderate Correlation - 33.3% Low Correlation - 0%

DATA STRUCTURES -LAB

UCYR101

Semester : I

Credit : 4

Category : Major Core (DSC) - II

Hours/Week : 5

Class &Major: I B.Sc Cyber Security

Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the fundamental concepts and operations of data structures, including singly linked lists, stacks, queues, and priority queues.
CO-2	Apply and implement expression evaluation techniques using stacks, including converting and evaluating infix and postfix expressions.
CO-3	Analyze and perform operations on binary search trees (BST) and AVL trees, including insertion, deletion, and searching, and assess their impact on tree structure and performance.
CO-4	Evaluate and manage advanced data structures and systems, such as implementing a hash-based password storage system and creating a BST for log storage with timestamps and activity types.
CO-5	Create and develop complex data structures and algorithms, including priority queues, AVL trees, and applications using graphs, trees, or heaps, tailored to specific problem-solving needs.

List of Exercises:

Implement the following exercises using Python Programming language:

1. Implement the following using a singly linked list.
 - a. Stack ADT and Queue ADT
2. Display the Evaluation expression using stack Infix expression and Postfix expression.
3. Implement priority queue ADT.
4. To perform the binary search tree operations:
 - a. Insert and Delete, Search.
5. To perform the following operations
 - a. Insertion into an AVL-tree and Deletion from an AVL-tree.
6. Implement DSS using graph/tree/heap
7. Implement a simple hash-based password storage system in Python
8. Create a BST to store logs with timestamps and activity types

Text Books

- Yashavant Kanetkar(2022), "*Data Structures Through C*" - 4th Edition: Learn the fundamentals of Data Structures through C
- Seymour Lipschutz(2017) , "*Data Structures with C*", First Edition, Schaum's outline series in computers, Tata McGraw Hill .

Reference Books

- R.Krishnamoorthy and G.Indirani Kumaravel (2008), "Data Structures using C", Tata McGrawHill
- A.K.Sharma (2011), "Data Structures using C", Pearson Education India.
- Sanjoy Dasgupta, C.Papadimitriou and U.Vazirani (2008), *Algorithms*, Tata McGraw-Hill,

e- Resources:

- <https://logicmojo.com/data-structures-and-algorithms>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO1	Recall and describe the fundamental concepts and operations associated with singly linked lists, including Stack ADT and Queue ADT and Explain the process of expression evaluation using stacks, including the conversion and evaluation of infix and postfix expressions.	K1,K2
CO2	Implement a priority queue ADT using appropriate data structures and algorithms.	K3

CO3	Perform and analyze binary search tree operations, including insertion, deletion, and searching for efficiency and correctness.	K4
CO4	Evaluate and execute AVL-tree operations, including insertion and deletion, to maintain tree balance and efficiency.	K5
CO5	Develop and implement data structures and systems such as hash-based password storage, BST for logs, and data structures using graphs, trees, or heaps.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	1	1
CO2	3	3	2	1	2	1
CO3	3	3	3	1	1	1
CO4	3	3	3	1	2	1
CO5	3	3	3	1	2	1

High Correlation - 40.00% Moderate Correlation - 20.0% Low Correlation - 40.0%

FUNDAMENTALS OF CYBER SECURITY UCYF101

Semester : I Credit :2
 Category : Foundation Course(FC)-IV Hour/Week :2
 Class & Major : I B.SC Cyber Security Total Hour :26

COURSE OBJECTIVES

COs	To enable the students to
CO1	Understand the fundamental components of information systems, including the Software Development Life Cycle (SDLC) and Security Software Development Life Cycle (SSDLC), and the role of security professionals within an organization.
CO2	Identify the business need for security, including understanding various threats, attacks, and the principles of secure software development.
CO3	Apply security technologies, such as access control mechanisms, firewalls, intrusion detection and prevention systems, and protection for remote connections, to safeguard information systems.
CO4	Analyze cryptographic foundations, including cipher methods, cryptographic algorithms, tools, and communication protocols, and assess potential attacks on cryptosystems.
CO5	Evaluate and implement risk management strategies, including risk identification, assessment, control strategies, and selection of appropriate risk control measures to manage and mitigate risks effectively.

UNIT-I INTRODUCTION TO INFORMATION SECURITY

06 Hours

Components of Information System - Software Development Life Cycle -Security Software

Development Life Cycle - Security Professionals and the Organisation - Communicates Of Interest

UNIT- II NEED FOR SECURITY

04 Hours

Introduction - Business Need First - Threats - Attacks - Secure Software Development.

UNIT- III SECURITY TECHNOLOGIES

05 Hours

Introduction - Access Control - Firewall - Protecting Remote Connections - Intrusion Detection and Prevention System

UNIT- IV CRYPTOGRAPHY

05 Hours

Foundation of Cryptology - Cipher Methods - Cryptographic Algorithms - Cryptographic Tools -Protocols for Communication - Attacks on cryptosystems.

UNIT- V RISK MANAGEMENT

06 Hours

Introduction - An over view of Risk Management - Risk Identification - Risk Assessment - Risk Control Strategies - Selecting a Risk Control Strategy

Text Book

- Michael E. Whitman, Herbert J. Mattord. (2021), “ *Principles of Information Security*”, CENGAGE Learning, 7th Edition. (I,II,III,IV,V UNIT) (Unit I Chapter 1, Unit II Chapter 2, Unit III Chapter 6,7, Unit IV Chapter 8, Unit V Chapter 4).

Reference Books

- William Stallings. (2015).” *Cryptography and Network Security - Principles and Practice*”, Pearson Education, 7th Edition.
- Atul Kahate.(2008).” *Cryptography and Network Security*”, McGraw Hill, 4th Edition

COURSE OUTCOME

COs	On the successful completion of the course, students will be able to	Blooms Level
CO1	Recall the fundamental components of information systems, including the Software Development Life Cycle (SDLC) and Security Software Development Life Cycle (SSDLC) and Explain the need for security in information systems, including various threats, attacks, and principles of secure software development.	K1,K2
CO2	Implement security technologies such as access control mechanisms, firewalls, and intrusion detection and prevention systems to protect information systems.	K3
CO3	Examine cryptographic methods, including cipher techniques, cryptographic algorithms, and communication protocols, and analyze potential attacks on cryptosystems.	K4

CO4	Assess risk management strategies, including risk identification, assessment, and control strategies, and select appropriate risk control measures.	K5
CO5	Develop a comprehensive information security plan incorporating the principles of risk management, cryptography, and security technologies to address specific organizational needs.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	3
CO2	3	3	3	2	2	3
CO3	3	3	3	2	2	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	2	3

High Correlation - 60.00% Moderate Correlation - 40.0% Low Correlation - 2%

PROGRAMMING IN PYTHON UCYM201

Semester : II

Credit : 4

Category : Core Course -III

Hour/Week : 5

Class & Major: I B.Sc Cyber Security

Total Hour : 65

COURSE OBJECTIVES

CO.NO.	To enable the students
CO1	Understand the basic syntax and fundamental concepts of Python, including variables, data types, and basic style guidelines.
CO2	Apply Python functions and operators effectively, including numeric types, sequences (strings, lists, tuples), and built-in methods for various data operations.
CO3	Analyze and implement control structures and looping mechanisms in Python, including conditionals and loops, to handle file operations and manage input/output.
CO4	Evaluate and use Python classes and modules to create organized and functional code, incorporating object-oriented principles and functional programming concepts.
CO5	Create Python programs that integrate database programming techniques, including SQL operations, and use regular expressions for text processing and pattern matching.

UNIT-I INTRODUCTION

13 Hours

Python - origins - features - variable and assignment - Python basics - statement and syntax - Identifiers - Basic style guidelines - Python objects - Standard types and other built-in types - Internal types - Standard type operators - Standard type built-in functions..

UNIT- II-FUNCTIONS AND OPERATORS

13 Hours

Numbers - Introduction to Numbers - Integers - Double precision floating point numbers - Complex numbers - Operators - Numeric type functions - Sequences: Strings, Lists and Tuples - Sequences - Strings and strings operators - String built-in methods - Lists - List type Built in Methods - Tuples.

UNIT- III CONTROL STATEMENTS

13 Hours

Mapping type: Dictionaries - Mapping type operators - Mapping type Built-in and Factory Functions - Mapping type built in methods - Conditionals and loops - if statement - else Statement - elif statement - conditional expression - while statement - for statement - break statement - continue statement - pass statement - Iterators and the iter() function - Files and Input/Output - File objects - File built-in functions - File builtin methods - File built-in attributes - Standard files - command line arguments.

UNIT- IV CLASS AND MODULES

13 Hours

Functions and Functional Programming - Functions - calling functions - creating functions - passing functions - Built-in Functions: apply(), filter(), map() and reduce() - Modules - Modules and Files - Modules built-in functions - classes - class attributes - Instances.

UNIT- V DATABASE PROGRAMMING

13 Hours

Database Programming - Introduction - Basic Database Operations and SQL - Example of using Database Adapters, MySQL - Regular Expression - Special Symbols and Characters - REs and Python.

Text Books

- John V. Guttag (2021),” Introduction to Computation and Programming Using Python”, Third Edition, The MIT Press.
- Charles Dierbach,(2015),”*Introduction to Computer Science using Python - A computational Problem solving Focus*”, Wiley India Edition.
- Wesley J. Chun,(2016), “*Core Python Applications Programming*”, 3rd Edition , Pearson Education.

Reference Books

- Mark Lutz,(2018),”*Learning Python Powerful Object Oriented Programming*”, O’reilly Media, 5th Edition.
- Timothy A. Budd, (2011), “*Exploring Python*”, Tata MCGraw Hill Education Private Limited, 1st

Edition.

e-Resource

- https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
- Python -Object Oriented | Tutorialspoint
- Corey Schafer -YouTube

COURSE OUTCOMES

CO	On completion of the course, the student will be able to	Bloom's level
CO1	Recall and describe the fundamental concepts and syntax of Python, including variables, types, and basic style guidelines and Explain the use of Python functions and operators, including numeric types, sequences (strings, lists, tuples), and their built-in methods.	K1, K2
CO2	Implement control statements and loops in Python, such as conditionals (if, else, elif) and looping constructs (while, for), and handle files and input/output operations.	K3
CO3	Analyze and utilize Python classes and modules, including functional programming concepts, class attributes, and instance methods, and understand their interactions.	K4
CO4	Evaluate and apply database programming techniques in Python, including basic database operations, SQL queries, and using database adapters such as MySQL.	K5
CO5	Develop comprehensive Python programs incorporating functions, classes, modules, and database interactions, and use regular expressions for pattern matching and text processing.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	1
CO2	3	3	3	2	3	2
CO3	3	3	3	2	3	2
CO4	3	3	3	2	3	2
CO5	3	3	3	2	3	2

High Correlation - 56.67% Moderate Correlation - 40.00 % Low Correlation - 3.33%

PROGRAMMING IN PYTHON LAB UCYR201

Semester : II

Credit : 4

Category : Core Course-IV

Hour/Week : 5

Class & Major : I B.Sc Cyber Security

Total Hour :65

COURSE OBJECTIVES

Co.No.	To Enable The Students
CO-1	Understand and apply basic control flow structures, including if statements and for loops, to develop Python programs.
CO-2	Apply Python data structures, such as lists and tuples, to implement various functionalities including stacks, queues, and sequences.
CO-3	Create and use custom Python modules for mathematical operations and integrate them into programs to enhance modularity and code reuse.
CO-4	Analyze and develop programs that handle file operations, including reading/writing files and

	creating/deleting directories, as well as drawing shapes using Turtle graphics.
CO-5	Evaluate and implement object-oriented programming concepts by writing programs using classes, and connect with MySQL to create a functional address book, including handling string manipulations and regular expressions.

LAB EXERCISES

1. All kinds of Data types.
2. Operators
3. Decision Making
4. Looping
5. Functions
 - a. Calling Value-Returning Functions
 - b. Calling Non-Value-Returning Functions
 - c. Recursive Functions
6. Dictionaries', List, tuples and sets.
7. Object Oriented Programming
 - a. Class
 - b. Constructor
 - c. Polymorphism
 - d. Inheritance
8. Files.
9. Exception Handling
10. Database programming.

Text Books

- Al Sweigart (2021), "The Big Book of Small Python Projects: 81 Easy Practice Programs", No Starch Press, 1st Edition.

Reference books

- Eric Matthes(2019), "Automate the Boring Stuff with Python, Practical Programming for Total Beginners, No Starch Press", 2nd Edition.

COURSE OUTCOMES

CO	On completion of the course the student will be able to	Bloom's Level
CO1	Recall and apply basic arithmetic operations in Python by creating a simple calculator program, and Explain and utilize control flow tools like if statements in Python programming.	K1
CO2	Implement and use loops, specifically for loops, in Python to iterate over sequences and perform repetitive tasks.	K2
CO3	Utilize Python data structures effectively, including using lists as stacks and queues, and applying tuples and sequences for data management.	K3
CO4	Create and use custom Python modules for mathematical operations and integrate them into programs to enhance modularity and functionality.	K5
CO5	Develop Python programs that perform file operations (read/write, create/delete directories), draw shapes using Turtle graphics, use classes for object-oriented design.	K6

Storage management: Mass-Storage Structure, Disk Structure, Disk Scheduling.

UNIT- V FILE SYSTEM INTERFACE

06 Hours

File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.

Text Book

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2016), *Operating System Principles*, 7th edition, Wiley India Private Limited, New Delhi.

Reference Books

Stallings (2006), *Operating Systems, Internals and Design Principles*, 5th edition, Pearson Education, India.

Andrew S. Tanenbaum (2007), *Modern Operating Systems*, 2nd edition, Prentice Hall of India, India.

COURSE OUTCOMES

COs	On the successful completion of the course, students will be able to	Blooms Level
CO1	Recall and describe the basic concepts of operating systems, including their generations, types, structure, and key components such as system calls and boot processes, and Explain the principles of process management, including process states, process control blocks, and scheduling methods, as well as multithreaded programming concepts.	K1,K2
CO2	Implement and manage memory management techniques, such as paging, segmentation, and demand paging, and address issues related to deadlock prevention and detection.	K3
CO3	Examine and analyze storage management structures, including disk structures and disk scheduling algorithms, to evaluate their effectiveness and performance.	K4
CO4	Assess and evaluate file system interfaces, including file concepts, access methods, directory structures, and allocation methods, to improve file system performance and management.	K5
CO5	Develop and implement solutions for operating system challenges by designing file systems, managing processes, and optimizing memory and storage management strategies.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	1
CO2	3	3	3	2	3	1
CO3	3	3	3	2	2	1
CO4	3	3	3	2	3	1
CO5	3	3	3	2	3	1

High Correlation - 60.0%

Moderate Correlation - 23.33 %

Low Correlation - 16.6%

ESSENTIALS OF CYBER SECURITY
UCYD101

Semester : II **Credit : 1**
Category : Skill Enhancement Course (SEC)-3 **Hour/Week : 2**
Class & Major : I B.SC Cyber Security **Total Hour : 26**

COURSE OBJECTIVES

COs	To enable the students
CO1	Understand the fundamental principles of security, including access control, security policies, and physical security controls, and their role in protecting information systems.
CO2	Apply knowledge of video surveillance systems and intrusion detection systems to monitor and secure environments effectively.
CO3	Implement protection strategies for remote access and local computing devices by utilizing local protection tools and configuring browser security options.
CO4	Analyze and evaluate perimeter security measures, including the use of firewalls, to safeguard data and understand their impact on overall security.
CO5	Create and integrate monitoring solutions using various tools and software to identify and address vulnerabilities in a security system.

UNIT-I BASICS OF SECURITY

05 Hours

Infrastructure Security in the Real World-Security Challenges, Understanding Access-Control and Monitoring Systems - Access Control-Security Policies-Physical Security Controls-Authentication Systems-Remote-Access Monitoring,

UNIT- II VIDEO SURVEILLANCE SYSTEM

05 Hours

Understanding Video Surveillance Systems-Video Surveillance Systems. Understanding Intrusion-Detection and Reporting Systems.

UNIT- III PROTECTION

05 Hours

Protecting Remote Access - Protecting Local Computing Devices Implementing Local Protection Tools-Using Local Intrusion-Detection Tools Configuring Browser Security Options.

UNIT- IV SECURING DATA

05 Hours

Understanding the Environment-The Basics of Internet Security- Understanding the Environment - Protecting the Perimeter-Understanding the Perimeter-Firewalls.

UNIT- V MONITORING TOOLS

06 Hours

Tools and Utilities-Using Basic Tools-Monitoring Tools and Software Identifying and Defending against Vulnerabilities.

Text Book

- Shinde, A. (2021). Introduction to cyber security: Guide to the World of Cyber Security. Notion

Press.

- Charles J. Brooks,(2018). *Cyber security Essentials*, Christopher Grow, Philip Craig, Donald Short, Sybex

Reference Books

- B.B.Gupta, D.P.Agrawal, Haoxiang Wang ,(2018). *Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives*, CRC Press.

COURSE OUTCOME:

COs	On the successful completion of the course, students will be able to	Blooms Level
CO1	Recall and describe basic security concepts, including access control, security policies, and physical security controls, and Explain the functions and importance of video surveillance systems, intrusion detection, and reporting systems in security management.	K1,K2
CO2	Implement protection measures for remote access and local computing devices, using local protection tools and configuring browser security options.	K3
CO3	Analyze the basics of internet security and perimeter protection, including the role of firewalls in safeguarding the environment.	K4
CO4	Evaluate and utilize monitoring tools and software to identify and defend against security vulnerabilities, and assess their effectiveness	K5
CO5	Develop comprehensive security solutions by integrating knowledge of access control, video surveillance, protection tools, and monitoring systems to address real-world security challenges.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	1	1
CO2	3	2	3	2	1	1
CO3	3	3	2	2	1	1
CO4	3	3	3	2	2	2
CO5	3	3	3	3	2	2

High Correlation - 43.33%

Moderate Correlation - 33.33 %

Low Correlation - 23.33%

DESKTOP PUBLISHING

UCYS102/UCSS102

Semester : II

Credit : 1

Category : Self-Study Paper

Hours/Week : 2

Class & Major : I B.SC Cyber Security

Total Hours : 26

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand and demonstrate the basic functionalities of MS-Word/PageMaker, including creating and formatting documents, managing text and graphics, and using page layout features.
CO-2	Apply CorelDRAW tools and techniques for creating and editing logos, applying special effects, and adjusting graphical elements to produce professional-quality designs.
CO-3	Utilize Photoshop tools and features, such as the Marquee Tool, Gradient Tool, and various filters, to enhance and manipulate images for various design purposes.
CO-4	Analyze and evaluate design elements and techniques across MS-Word/PageMaker, CorelDRAW, and Photoshop to determine their effectiveness and make improvements to design projects.
CO-5	Create comprehensive design projects by integrating functionalities from MS-Word/PageMaker, CorelDRAW, and Photoshop to produce cohesive and professional documents and graphics.

UNIT - I MS-WINDOW&PAGEMAKSER

9 Hours

Introduction to Computer-Computer Basics-Creating Folder-Directories- Type Settings for Publication, Page Layout, Word Wrapping, Grouping, Merging two or more files, Creating columns, Tab settings, Paragraph settings, Hyphenation, Paper Style, Index & Table of Contents, Fonts, Mixing Text & Graphics, inking objects, Printing facility.

UNIT - II CORELDRAW

9 Hours

Logo Designing, Frame Settings Graphical Tools, Bitmap & Shadow Effects -Special Effects such as Perspective -Blending, Text Settings into objects -Alignment Setting -Tabs, Power Line -Power Clip -Contour -Import & Export Facility

UNIT - III PHOTOSHOP

8 Hours

All Tools (Marquee Tool, Magnetic Tool, Slice Tool, Patch Tool, Clone Stamp Tool, Gradient Tool, Smudge Tool, Blur Tool, Text Tool etc.) Fill, Stroke Option -Histogram, Group, Ungroup -Lock Object, Color Range -Feather, Modify, Grow, Filter -Liquify, Artistic- Blur, Video Option etc.

Textbooks:

- Dr. Pankaj Dadhich (2023).” *Desktop Publishing for Beginner*”,Notion press
- Sandee Cohen,(2015), “*InDesign CC: Visual QuickStart Guide*”, Peachpit Press.

Reference Book:

CO-2	Apply data acquisition techniques and tools to collect and validate digital evidence, including RAID data acquisitions and remote network acquisition methods.
CO-3	Utilize current computer forensics tools, both software and hardware, for effective evidence collection and validation, and address common data-hiding techniques.
CO-4	Analyze the effectiveness of various computer forensics tools and methods, and assess their application in investigations such as email crimes and violations.
CO-5	Evaluate and create comprehensive forensic investigation plans that incorporate various tools and techniques to address complex forensic challenges and digital evidence scenarios.

UNIT - I BASIC OF FORENSICS

8 Hours

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.

UNIT - II DATA ACQUISITION

9 Hours

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools..

UNIT - III COMPUTER FORENSICS TOOLS

9 Hours

Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool

Text BookS:

- Gogolin, G. (2021). *“Digital forensics explained”*. CRC Press.
- Warren G. Kruse II and Jay G. Heiser,(2002),*Computer Forensics: Incident Response Essential*, Addison Wesley.

Reference Book:

- Nelson, B, Phillips, A, En finger, F, Stuart, C.,(2006). *“Guide to Computer Forensics and Investigations, 2nd ed.*, Thomson Course Technology

e-Resources:

- <https://www.udemy.com/course/digital-forensics-course/>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO1	Understand the fundamental concepts of computer forensics, including the benefits, types of computer crimes, and legal concerns related to forensics, and Explain the principles of data acquisition, including storage formats, acquisition methods, and the importance of validating data acquisitions.	K1

CO2	Utilize various data acquisition tools and techniques, such as RAID data acquisitions and remote network acquisition tools, to collect digital evidence effectively.	K2
CO3	Evaluate and validate computer forensics tools and techniques, addressing data-hiding methods, and conducting investigations into email crimes and violations.	K3
CO4	Assess the effectiveness of current computer forensics tools (both software and hardware) and their application in different forensic scenarios.	K4, K5
CO5	Develop and implement comprehensive forensics investigations using a range of tools and techniques to address various types of digital evidence and forensic challenges.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	3	2	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation - 63.33% Moderate Correlation - 36.66 % Low Correlation - 0%

HARDWARE TROUBLESHOOTING

UCYS202/UCSS202

Semester : II

Credit : 1

Category : Self-Study Paper

Hours/Week : 2

Class &Major: I B.sc Cyber Security

Total Hours : 26

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the importance of hardware troubleshooting, including safety precautions, best practices, and the use of tools and equipment
CO-2	Learn to use diagnostic software and built-in diagnostics tools, troubleshoot hardware problems, analyze error codes, and implement regular system maintenance practices.
CO-3	Develop skills in troubleshooting specific hardware issues, such as problems with CPUs, RAM, motherboards, storage devices, and network cards, and understand safe handling and replacement of components.
CO-4	Implement data backup and disaster recovery planning as part of a comprehensive

	maintenance strategy.
CO-5	Gain practical experience in advanced troubleshooting techniques, including soldering and de soldering hardware components when applicable

UNIT - I INTRODUCTION TO HARDWARE TROUBLESHOOTING

8 Hours

Importance of hardware troubleshooting- Safety precautions and best practices- Tools and equipment for hardware troubleshooting- Identification and functions of essential hardware components (CPU, motherboard, RAM, storage devices, etc.)

UNIT - II DIAGNOSTICS AND TESTING

9 Hours

Using diagnostic software and built-in diagnostics tools-Troubleshooting techniques for hardware problems-Analyzing error codes and system messages- Importance of regular system maintenance- Cleaning and cooling system maintenance-Data backup and disaster recovery planning.

UNIT - III TROUBLESHOOTING SPECIFIC HARDWARE ISSUES

9 Hours

Troubleshooting common issues with CPUs, RAM, and motherboards-Identifying and resolving storage device problems-Network card and peripheral troubleshooting, Safe handling of components- Replacing hardware components (e.g., RAM, hard drives, power supplies)-Soldering and desoldering techniques (if applicable)

Text Book:

- Prof. Shilpa R. Yadav (2023), "*COMPUTER HARDWARE AND TROUBLESHOOTING*", Notion press.
- Mark Minasi, (2016), *The Complete PC Upgrade and Maintenance Guide*", Sybex

Reference Book:

- Morris Rosenthal, 2012, "Troubleshooting and Repairing Major Appliances", McGraw-Hill Education

e-Resources:

- <https://www.youtube.com/watch?v=L2E7vpj3Iq8>
- <https://www.youtube.com/watch?v=Jh4Fu2AbJ7M>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO1	Identify and describe the functions of essential hardware components in a computer system.	K1, K2

CO2	Implement safety precautions and best practices while handling computer hardware.	K3
CO3	Classify preventive maintenance on computer systems to enhance their lifespan and reliability.	K4
CO4	Formulate strategies for systematic hardware troubleshooting, including isolating and testing components.	K5
CO5	Analyze error messages and diagnostic codes to identify hardware issues.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	2	1
CO2	3	3	2	2	3	1
CO3	3	3	3	2	3	2
CO4	2	3	3	2	3	2
CO5	3	3	3	2	3	2

High Correlation - 53.33% Moderate Correlation - 40.00 % Low Correlation - 6.66%

III AND IV EVALUATION OF COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Core Course- I	UCYM101	Data Structures	Assignment	Poster Design
	Core Course- II	UCYR101	Data Structure -Lab	DPA	Viva-voce
	Foundation Course(FC)	UCYF101	Fundamentals of Cyber Security	Working Model	Poster Design
II	Core Course- III	UCAM208/ UCSM208	Programming in Python	Problem Solving	Poster Design
	Core Course- IV	UCAR208/ UCSR208	Programming in Python - Practicals	DPA	Viva-voce
	Foundation Course	UCYD201	Operating Systems	Assignment	Poster Design

DEPARTMENT OF COMPUTER SCIENCE (M.Sc. DATA SCIENCE)

PREAMBLE

PG : Programme Profile and Syllabi of Courses from I to II semesters along with Evaluation Components III and IV (With effect from 2024-2026 Batch Onwards)

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	On completion of this programme, students will be able to
PSO-1	Demonstrate proficiency in utilizing mathematical and statistical techniques to analyze complex datasets.
PSO-2	Interpret intricate data sets to generate actionable recommendations and strategic insights for decision-making processes.
PSO-3	Apply machine learning algorithms and artificial intelligence techniques to solve real-world problems across diverse domains.
PSO-4	Utilize data-driven approaches to support decision-making processes and solve complex business problems.
PSO-5	Develop sustainable solutions for society and propose strategies for responsible data usage and privacy protection.
PSO-6	Engage in continuous professional development to stay updated with the cutting edge technologies in the field of data science.

PROGRAMME PROFILE M.Sc. (DATA SCIENCE)

Semester	Category	Course Code	Course Title	Contact Hrs/Week	Credit Min/Max
I	Core Courses - I	PDSM101	Foundations of Data Science	5	4
	Core Courses - II	PDSM102	Python for Data Science	5	4
	Core Courses - III	PDSR101	Python for Data Science - Lab	5	4
	Elective (Generic / Discipline Centric)-I	PDSO101	Mathematics for Data Science	5	3
	Elective (Generic / Discipline Centric)-II	PDSM103	Information Security and Ethics	5	3
	Skill Enhancement			3	2

	Course SEC 1 –(NME)				
	Skill Enhancement Online Course		Data Science using Excel	2	2
Total				30	22
II	Core Courses – IV	PDSM201	Distributed Systems	5	4
	Core Courses – V	PDSM202	Artificial Intelligence and Machine Learning	5	4
	Core Courses – VI	PDSR201	Artificial Intelligence and Machine Learning - Practical using (Python/R)	5	4
	Core Industry Module-I	PDSM203	Software Engineering for Data Science	4	3
	Elective (Generic / Discipline Centric)-III	PDSO201	Probability and Statistical Computing	4	3
	Elective (Generic / Discipline Centric)-IV	PDSM204	MEAN Stack development	4	3
	Skill Enhancement Course SEC 1 –(Discipline)	PDSM201	R Programming	3	2
	Service Learning (IV)	PALE201		-	1
	Internship/Field visit(IV)	PINS201		-	2
Total				30	26
III	Core Courses – VII	PDSM301	Computational Intelligence Cloud and Web Intelligence	5	4
	Core Courses – VIII	PDSM302	NoSQL Databases	5	4
	Core Courses – IX	PDSR301	NoSQL Databases - Practical	5	4
	Core Industry Module - II	PDSM303	Business Intelligence & Analytics Business Intelligence Tools	4	3
	Elective (Generic / Discipline Centric) –V	PCSO301/ PDSO301	Block chain Technologies	4	3
	Elective (Generic / Discipline Centric)- VI	PCSR321/ PDSR302	Block chain Technologies - Lab	3	3
	Skill Enhancement Course SEC 3 (Interdisciplinary)	PCSI302/ PDSI301	Research Methodology: Methods and Techniques	4	2
Total				30	23
IV	Core Courses – X	PDSM401	Image and Video Analytics	5	4

	Core Courses – XI	PDSM402	Deep Learning	5	4
	Core Courses – XII	PDSR401	Deep Learning - Lab	5	4
	Project with Viva-Voce	PDSP401	Project and Viva-Voce	6	4
	Elective- Discipline Specific	PDSO401	Augmented and Virtual Reality	5	3
	Skill Enhancement Course - Professional Competency Skill	PDSC401	Professional Competency	4	2
	Internship/Field visit(IV)	PINS401	Internship		-/2
Total				30	21/23
Grand Total				120	92/94

NON-MAJOR ELECTIVE

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Skill Enhancement Course (Non Major Elective)	PCSE101/ PDSE101	Web Application Development	3	2
	Skill Enhancement Course- SEC-2 (Non Major Elective)	PCSE102/ PDSE102	Mobile Application Development using android	3	2

SELF-STUDY

Semester	Category	Course Code	Course Title	Contact Hrs/week	Credit
I	Self-study Paper	PDSS101	MERN Full Stack Web Development	2	1
II	Self-study Paper	PDSS201	Digital Marketing Analytics	2	1
III	Self-study Paper	PDSS301	Open Source Technology	2	1
IV	Self-study Paper	PDSS401	DEVOPS	2	1

FOUNDATIONS OF DATA SCIENCE

PDSM101

Semester : I

Credit : 4

Category : Core Course-I

Hour/Week: 5

Class & Major: I M.Sc Data Science

Total Hour: 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the fundamental concepts and tools of data science
CO-2	Learn effective data collection, preprocessing, and cleaning strategies.
CO-3	Understand the techniques and applications of supervised learning
CO-4	Explore unsupervised learning methods and their use in real-world scenarios.
CO-5	Analyze the deep learning concepts and practical implementation using Python libraries like Keras.

UNIT- I INTRODUCTION

12 Hours

Introduction to Data Science –Fundamental python library for data structure - Integrated development environment- Get Started with Python and Pandas- Data Preparation- Exploratory Data Analysis – Estimation - Statistical Inference

UNIT- II DATA COLLECTION STRATEGIES`

14 Hours

Data Collection Strategies –Data Pre-Processing Overview–Data Cleaning–Data Integration and Transformation–DataReduction–Data Discretization.

UNIT- III SUPERVISED LEARNING

11 Hours

Introduction– Learning Curves - Training- Validation and Test-. Regression Analysis- Linear Regression - Logistic Regression.

UNIT- IV REG UNSUPERVISED LEARNING

15 Hours

Clustering - Network Analysis- Basic Definitions in Graphs - Social Network Analysis- Centrality- Basics of Natural Language Processing- Introduction - Text Representation

UNIT- V DEEP LEARNING

13 Hours

Perceptron - Multilayer Perceptron- Playing with Neural Networks- Deep Learning with Keras- Convolutional Neural Networks

Text Books:

- Laura Igual, Santi Seguí(2024),”Introduction to Data Science A Python Approach to Concepts, Techniques and Applications”, Springer.

Reference Books:

- Joel Grus,(2018), “Data Science from Scratch” O’REILLY.
- Rafael A. Irizarry,(2022), “Introduction to Data Science”, Chapman & Hall.
- Gupta. S.C. & Kapoor,V.K.,(2002),”Fundamentals of Mathematical Statistics”, Sultan Chand & Sons Pvt. Ltd. New Delhi.
- Cathy O’Neil and Rachel Schutt, (2015), “Doing Data Science”, O’Reilly.
- David Dietrich, Barry Heller, Beibei Yang, (2013), “Data Science and Big data Analytics”, EMC.
- Raj, Pethuru (2014), “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

e-Resources

<https://archive.nptel.ac.in/courses/106/106/106106212/> - (EDA , Regression)

<https://archive.nptel.ac.in/courses/106/105/106105186/> - (Supervised and unsupervised)

Course Outcomes

Cos	On the successful completion of the course, students will be able	Blooms Level
CO-1	Understand the basics of data science and proficiently use Python libraries for data manipulation and analysis.	K1
CO-2	Explain effective data collection, preprocessing, and cleaning strategies.	K2
CO-3	Apply supervised learning techniques, including regression analysis, and evaluate model performance.	K3
CO-4	Articulate and adapt deep learning models ,unsupervised learning methods, including clustering and network analysis, in various applications	K4,k5
CO-5	Implementing data collection, supervised and unsupervised, deep learning models use cases.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION – 0.00%

PYTHON FOR DATASCIENCE**PDSM102****Semester : I****Credit : 4****Category : Core Course-II****Hour/Week: 5****Class & Major: I M.Sc Data Science****Total Hour: 65****COURSE OBJECTIVES**

CO No.	To enable the students
CO-1	Introduce fundamental concepts of Python programming and essential data structures.
CO-2	Familiarize with popular data science libraries for data analysis and visualization.
CO-3	Explore functional programming concepts and their practical applications in Python.
CO-4	Develop skills in data wrangling techniques using Pandas for effective data manipulation.
CO-5	Build proficiency in handling and analyzing text files.

UNIT- I INTRODUCTION**13 Hours**

Introduction Notebook – Fundamental of python – Data Structures: Lists, Dictionaries, Tuples, Sets – File handling – Regular Expressions

UNIT- II DATA SCIENCE LIBRARY**13 Hours**

Numpy – Scipy – Pandas – Visualiation library – Machine learning library – Natural language tool kit- Matplotlib , Seaborn, Pandas

UNIT- III FUNCTIONAL PROGRAMMING **13 Hours**

Functional Programming: Lambda, Iterators, Generators, List Comprehensions – NumPy Arrays – Pandas Series – Pandas Dataframes.

UNIT- IV DATA WRANGLING **13 Hours**

Pandas–DataFrames – Missing data –Concatenate, Join and Merge – Reading and Writing data.

UNIT- IV Text File **13 Hours**

Test file and their format – writing text to a file – writing number to a file - Reading text to a file – Reading number to a file - Accessing and Manipulating Files and Directories on Disk- Case Study: Text Analysis

Text Books

- Behrman, K. (2021). Foundational Python for Data Science. United Kingdom: Pearson Education.
- K.A. Lambert (2018), “*Fundamentals of Python: first programs*”, Second Edition, Cengage Learning
- Williams, E. (2019). Python for Data Science: The Ultimate Beginners' Guide to Learning Python Data Science Step by Step. United States: Independently Published.

Reference Books

- Fabio Nelli (2018), “*Python Data Analytics: With Pandas, NumPy, and Matplotlib*”, Second Edition, Kindle Edition.
- Stefanie Molin, (2019), “Data Analysis with Pandas”, Packt.
- Joel Grus, (2015), “Data Science from scratch”, O'Reilly.
- Wes Mc Kinney, (2012), “Python for Data Analysis”, O'Reilly Media.
- Jake Vanderplas,(2012), “Python Data Science Handbook: Essential Tools for Working with Data”.

e-Resource

- https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

- <https://www.python.org/>
- <https://www.w3schools.com/python/>
- <https://www.tutorialspoint.com/python/index.htm>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basics of Python programming, including data structures, file handling, and regular expressions.	K1, K2
CO-2	Demonstrate proficiency in using data science libraries such as NumPy, SciPy, Pandas, Matplotlib, Seaborn, and the Natural Language Toolkit (NLTK) for data analysis and visualization.	K3
CO-3	Apply functional programming concepts using lambda functions, iterators, generators, and comprehensions in Python.	K4
CO-4	Analyze data wrangling techniques, including handling missing data, and performing operations such as concatenating, joining, merging, and data I/O with Pandas.	K5
CO-5	Develop and implement programs to read, write, and manipulate text files and directories, and conduct text analysis through practical case studies.	K6

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	1	2	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	2	2	2
CO4	3	3	3	3	2	3
CO5	2	3	3	3	3	3

High Correlation – 53% Moderate Correlation – 43% Low Correlation – 3.3%

PYTHON FOR DATASCIENCE – LAB

PDSR101

Semester : I

Credit : 4

Category : Core Course - III

Hour/Week: 5

Class & Major : I M.Sc Data Science

Total Hour: 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Apply Object-Oriented Programming (OOP) concepts in Python to address various problems.
CO-2	Develop solutions utilizing functions from the NumPy and Pandas libraries.
CO-3	Perform data wrangling, aggregation, and grouping operations efficiently.
CO-4	Create effective data visualizations tailored to different contexts.
CO-5	Gain exposure to diverse data visualization techniques available in Python.

LIST OF PROGRAMS

1. Editing and executing Programs involving Flow Controls.
2. Editing and executing Programs involving Functions.
3. Program in String Manipulations
4. Creating and manipulating a Tuple
5. Creating and manipulating a List
6. Creating and manipulating a Dictionary
7. Object Creation and Usage
8. Program involving Inheritance
9. Program involving Overloading
10. Reading and Writing with Text Files and Binary Files
11. Combining and Merging Data Sets
12. Program involving Regular Expressions
13. Data Aggregation and GroupWise Operations

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recall and apply Object-Oriented Programming (OOP) concepts in Python to solve a variety of problems.	K1
CO-2	Demonstrate solutions using functions from the NumPy and Pandas libraries.	K2
CO-3	Write code for data wrangling, aggregation, and grouping operations.	K3
CO-4	Create data visualizations suited to different contexts.	K4
CO-5	Implement and evaluate data visualization techniques using Python.	K5, K6

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	1	2	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	3
CO4	2	3	3	3	2	3
CO5	2	3	3	3	3	3

High Correlation – 56.6% Moderate Correlation – 40% Low Correlation – 3.3%

INFORMATION SECURITY & ETHICS

PDSM103

Semester : I

Credit : 3

Category : Elective (Generic / Discipline Centric)- II

Hour/Week: 5

Class & Major : I M.Sc Data Science

Total Hour : 65

COURSE OBJECTIVES

CO No.	To enable the students
CO1	Explain the fundamental concepts of computer security and cryptography.
CO2	Identify and analyze various security threats to programs.
CO3	Assess database and network security measures and implement basic security controls.
CO4	Discuss ethical issues and professional codes of conduct in IT organizations.
CO5	Evaluate intellectual property rights and apply ethical decision-making in software development.

UNIT I: INTRODUCTION TO SECURITY

11 Hours

Key Information Security Concepts - Critical Characteristics of Information-CNSS Security Model-Components of An Information System - Security and the Organization.

UNIT II: INFORMATION SECURITY

15 Hours

Common Attack Pattern Enumeration and Classification (CAPEC) - Compromises to Intellectual Property -Deviations in Quality of Service- Espionage or Trespass- Forces of Nature - Human Error or Failure - Information Extortion - Sabotage or Vandalism - Software Attacks - Technical Hardware Failures or Errors - Technical Software Failures or Errors - Technological Obsolescence - Theft

UNIT III: INFORMATION SECURITY MANAGEMENT

13 Hours

Introduction to the Management of Information Security - Information Security Planning And Governance-Information Security Policy, Standards, And Practices- Security Education, Training, And Awareness Program - Information Security Blueprint, Models, And Frameworks

UNIT IV: RISK MANAGEMENT

13 Hours

Introduction To Risk Management-The Risk Management Framework-The Risk Management Process-Risk Treatment/Risk Response-Managing Risk-Alternative Risk Management Methodologies

UNIT V: LEGAL, ETHICAL, AND PROFESSIONAL ISSUES IN INFORMATION SECURITY

13 Hours

Introduction to Law and Ethics in Information Security - Relevant U.S. Laws- International Laws and Legal Bodies - Ethics and Information Security - Codes of Ethics of Professional Organizations

Text Book :

- Reynolds, G. W., & Stair, R. M. (2018). *Principles of information systems*. 7th edition Cengage Learning.

Reference Books:

- William Stallings (2011), George W. Reynolds, Ethics in Information Technology, 6th Edition.
- Herman T. Tavani, John Wiley and Sons,(2016), Ethics and Technology:Controversies, Questions, and Strategies for Ethical Computing, 5th Edition.
- Mark Rhodes Ousley (2013), Information Security: The Complete reference, 2nd Edition. McGraw Hill
- Mark Stamp (2018), Information Security Principles and Practice, Wiley Publication
- C. Warren Axelrod, Jennifer L. Bayuk, Daniel Schutzer (2009) ,Enterprise Information Security and Privacy, Artech House Press
- Hossein Bidgoli (2006), Handbook of Information Security, Threats, Vulnerabilities, Prevention, Detection, and Management; John Wiley & Sons

- J Andress, (2014)The Basics of Information Security, 2nd Edition; Syngress Press.

e-Resources

- <https://archive.nptel.ac.in/courses/106/106/106106129/>
- https://onlinecourses.nptel.ac.in/noc22_cs13/preview

COURSE OUTCOMES:

Cos	On the successful completion of the course, students will be able to	Blooms
CO1	Recognize and articulate ethical responsibilities in information security.	K1, K2
CO2	Design secure systems that comply with industry standards and address practical constraints.	K3
CO3	Analyze and interpret data within the context of security.	K4
CO4	Assess and resolve real-world security and ethical issues in technology.	K5
CO5	Develop effective strategies for managing cognitive load and evaluating data.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	2
CO2	3	3	2	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	3	3

High Correlation – 73.3% Moderate Correlation – 23.3% Low Correlation – 3.4%

DISTRIBUTED SYSTEMS

PDSM201

Semester : II

Credit :4

Category : Core Course-IV

Hour/Week: 5

Class & Major : I M.Sc Data Science

Total Hour: 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Define the critical characteristics of information and describe the CNSS Security Model.
CO-2	Explain the components of an information system and their significance for security.
CO-3	Discuss how security measures are integrated into organizational structures.
CO-4	Debate whether information security should be considered more of an art or a science.
CO-5	Develop a comprehensive understanding of information security within an organization.

UNIT I INTRODUCTION

13 Hours

Introduction to Distributed Systems - Collection of autonomous computing elements - Single coherent system - Design Goals- Supporting resource sharing - Making distribution transparent - Being open - Being scalable - Pitfalls - Types of Distributed Systems - High performance distributed computing - Distributed information systems - Pervasive systems

UNIT II ARCHITECTURES

13 Hours

Architectural Styles - Layered architectures- Object-based and service-oriented architectures- Resource-based architectures- Publish-subscribe architectures - Middleware Organization - Wrappers - Interceptors - Modifiable middleware -System Architecture - Centralized organizations - Decentralized organizations- Hybrid Architectures - Example Architectures

UNIT III DISTRIBUTED OBJECTS AND PROCESSES

13 Hours

Distributed objects and remote invocation, Communication between distributed objects, Remote procedure call, Events and notifications - The operating system layer, Protection, Processes and Threads - Threads in distributed systems – Virtualization- Application of virtual machines to distributed systems - Clients- Networked user interfaces - Client-side software for distribution transparency- Servers - General design issues- Object servers-

Server clusters- Code Migration.- Reasons for migrating code - Migration in heterogeneous systems

UNIT IV COMMUNICATION AND NAMING

13 Hours

Foundations - Remote Procedure Call -Basic RPC operation, Parameter Passing, RPC based Application Support - Message Oriented Communication - Simple Transient Messaging with Sockets, Advanced Transient Messaging, Message Oriented Persistent Communication - Multicast Communication. Naming: Names, Identifiers and Addresses - Flat naming – Structured naming - Attribute-based naming

UNIT V COORDINATION , CONSISTENCY AND REPLICATION)

13 Hours

Clock Synchronisation - Logical Clocks - Mutual Exclusion - Election Algorithms - Distributed Event Management. Consistency and Replication: Introduction - Data-centric Consistency Models - Client- Centric Consistency Models - Replica Management. Fault Tolerance: Introduction, Redundancy Strategies, Error Detection and Correction, Failure Recovery Mechanisms, Distributed Consensus Algorithms, Resilience Testing and Validation.

Text Books:

- Andrew, S. T. & Steen, M.V. (2017). Distributed Systems: Principles and Paradigms, (3rd Ed.). Pearson

Reference Books

- Coulouris, G., Dollimore, J., Kindberg, T & Blair, G. (2011). Distributed Systems: Concepts and Design. (5th Ed.). Addison Wesley.
- Smith, E.J & Nair, R. (2005). Virtual Machines: Versatile Platforms for Systems and Processes, (1st Ed.). Morgan Kaufmann.

e-Resources

- <https://www.tutorialspoint.com/Distributed-Systems>
- <https://link.springer.com/article/10.1007/s00607-016-0508-7>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO1	Identify common attack patterns and their classifications.	K1

CO2	Explain various security threats, including intellectual property compromises and human errors.	K2
CO3	Implement security policies, standards, and practices within an organization.	K3
CO4	Analyze and develop strategies for risk treatment and response.	K4, K5
CO5	Integrate legal and ethical considerations into professional information security practices.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	2	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation – 70% Moderate Correlation – 30% Low Correlation – 0%

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

PDSM202

Semester : II

Credit :4

Category : Core Course - V

Hour/Week: 5

Class & Major: I M.Sc Data Science

Total Hour: 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Define fundamental concepts related to artificial intelligence (AI) and machine learning (ML).
CO-2	Explain the principles and significance of various machine learning methods.
CO-3	Apply machine learning algorithms, including K-Nearest Neighbors (KNN) and neural networks.
CO-4	Evaluate the performance, strengths, and limitations of different machine learning models and algorithms.
CO-5	Develop and integrate comprehensive AI and ML solutions by combining various machine learning techniques.

UNIT - I INTRODUCTION TO AI & ML**13 Hours**

Introduction to AI and ML - Big Data and Not-So-Big Data - Types of Learning - Machine Learning Methods Based on Time Dimensionality - Linearity and Nonlinearity - Early Trends in Machine Learning

UNIT- II MACHINE LEARNING**13 Hours**

Linear and Generalized Linear Models - Linear Regression - Regularized Linear Regression- Generalized Linear Models - k-Nearest Neighbor (KNN) Algorithm.

UNIT-III NEURAL NETWORKS & DECISION TREE**13 Hours**

Perceptron - Multilayered Perceptron or Artificial Neural Network- Radial Basis Function Networks- Overfitting and Regularization-Types of Decision Tree- Algorithms for Building Decision Trees- Regression Tree - Decision Metrics

UNIT – IV SUPPORT VECTOR MACHINES AND**PROBABILISTIC MODEL****13 Hours**

Theory of SVM - Separability and Margins - Discriminative Model - Generative Models - Normal or Gaussian Distribution - Bernoulli Distribution - Binomial Distribution- Gamma Distribution- Poisson Distribution

UNIT-V: REINFORCEMENT LEARNING, DEEP LEARNING AND**APPLICATIONS****13 Hours**

Fundamental Equation of Dynamic Programming - Classes of Problems under Dynamic Programming - Reinforcement Learning - Exploration and Exploitation - Theory of Reinforcement Learning

Text Books:

- Ameet V Joshi(2020), “*Machine Learning and Artificial Intelligence*”, Springer.
- Stuart Russell and Peter Norvig (2003), “*Artificial Intelligence: A Modern Approach,*” Third edition, Pearson.

Reference Books

- Deisenroth, Faisal, Ong, (2020), *Mathematics for Machine Learning*, Cambridge

University Press.

- Parag Kulkarni and Prachi Joshi,(2015), “Artificial Intelligence – Building Intelligent Systems”, PHI learning Pvt. Ltd., ISBN – 978-81-203-5046-5.
- Solanki, Kumar, Nayyar,(2018), Emerging Trends and Applications of Machine Learning, IGI Global.
- Mohri, Rostamizdeh, Talwalkar,(2018), Foundations of Machine Learning, MIT Press.
- Kumar, Zindani, Davim,(2021),Artificial Intelligence in Mechanical and Industrial Engineering, CRC Press.
- Zsolt Nagy(2018), - Artificial Intelligence and Machine Learning Fundamentals- Apress.
- Artificial Intelligence by Elaine Rich, Kevin Knight and Nair, TMH

e-Resource

- <http://nptel.ac.in/courses/111101003/>
- <https://nptel.ac.in/courses/106/106/106106202/>

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom’s Level
CO1	Recall fundamental concepts of AI and ML, including learning types, early trends, and the distinctions between linear and nonlinear models.	K1
CO2	Understand and explain various machine learning methods, such as linear regression, regularized linear regression, and the k-Nearest Neighbors (KNN) algorithm.	K2
CO3	Apply neural network models and decision tree algorithms to machine learning problems, including perceptrons and multilayer perceptrons.	K3
CO4	Analyze and evaluate support vector machines (SVM) and probabilistic models, including their underlying theories and practical applications.	K4
CO5	Integrate and adapt reinforcement learning and deep learning techniques into practical applications, exploring concepts such as dynamic programming and the trade-off between exploration and exploitation.	K5,K6

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation – 76.6% Moderate Correlation – 23.3% Low Correlation – 0%

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING – PRACTICALS

PDSR201

Semester : II

Credit : 4

Category : Core Course -VI

Hour/Week: 5

Class & Major: I M.Sc. Data Science

Total Hour: 65

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Gain a comprehensive understanding of machine learning, including its interconnections with other fields and the fundamental issues and challenges it presents.
CO-2	Analyze the learning processes of artificial neural networks (ANNs) and explore their various applications.
CO-3	Apply classification algorithms to diverse datasets, compare their results, and evaluate searching and reasoning techniques for different use cases.
CO-4	Model both individual neurons and entire neural networks to understand their structure and function.
CO-5	Identify and select appropriate clustering algorithms for different pattern recognition tasks.

LIST OF PROGRAMS

1. To implement supervised/unsupervised/Reinforcement learning approach, build and evaluate a supervised classifier using Iris data set
2. Acquire and preprocess data from Boston housing data set/titanic data set/Iris dataset, and perform visualization and analysis to extract insights.
3. Perform feature extraction from Boston housing data set/titanic data set/Iris dataset and prepare training datasets for modeling.
4. Use techniques such as Recursive Feature Elimination (RFE) or LASSO regression for feature selection on a dataset
5. Implement PCA on a high-dimensional dataset to reduce its dimensions and visualize the principal components.
6. Build a classification model (e.g., Random Forest/SVM/NB) using a dataset (e.g., Titanic survival data), and evaluate its performance using metrics such as accuracy, precision, and recall.
7. Implement a regression model (e.g., Linear Regression) on a dataset (e.g., housing prices) and evaluate its performance using metrics such as Mean Squared Error (MSE) and R-squared.
8. Develop a Markov chain model to predict the state transitions in a manufacturing system and analyze its long-term behavior (e.g., machine failure rates). OR
9. Use Q-learning to optimize robot navigation in a grid environment or design a reinforcement learning agent to fine-tune engineering parameters
10. Use GA to optimize a multi-dimensional function (e.g., traveling salesman problem) or plan a robot's path through a maze Or
11. Implement a neural network for system identification (e.g., modeling a nonlinear system).

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO1	Define the role of machine learning across different fields and identify the fundamental issues and challenges involved.	K1
CO2	Classify the learning processes of artificial neural networks (ANNs) and examine their applications.	K2

CO3	Apply classification algorithms to various datasets, compare results, and utilize searching and reasoning techniques to enhance analysis.	K3
CO4	Analyze the structure and functionality of neurons and neural networks to understand their operations.	K4
CO5	Select and adapt appropriate clustering algorithms for different pattern recognition tasks and applications.	K5, K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation – 73.3% Moderate Correlation – 26.7% Low Correlation – 0%

SOFTWARE ENGINEERING FOR DATASCIENCE

PDSM203

Semester : II

Credit: 3

Category : Elective (Generic / Discipline Centric) – III

Hour/Week: 4

Class &Major: I M.Sc Data Science

Total Hour: 52

COURSE OBJECTIVES:

Cos	To enable the students
CO1	Describe key software engineering principles and their application.
CO2	Apply software life cycle models to guide software development processes.
CO3	Utilize requirements engineering techniques to gather and analyze requirements effectively.
CO4	Develop high-quality software by adhering to best practices and standards.
CO5	Implement appropriate testing methodologies to ensure software reliability and performance.

UNIT I: Software and Software Engineering**13 Hours**

The nature of software - Software Engineering - The Software Process - Software Engineering Practice - Software Myths. Process Models: A Generic Process Model - Process Assessment and Improvement - Prescriptive Process Models - Product and Process. Agile Development: Introduction - Agility and Cost of Change - Agile Process - Scrum - Other Agile Frameworks. Requirements Definition, Requirements Engineering, The Design Process, Approach to Software testing

UNIT II: Introduction to data science and software engineering**6 Hours**

The Role of Data Science in Software Engineering, Data Collection and Cleaning , Exploratory Data Analysis (EDA), Statistical Modeling, Machine Learning Basics, Model Selection and Evaluation, source control for data scientist, tool for source control.

UNIT III: Data Science In Software Engineering Practices**8 Hours**

Software Engineering Best Practices for Data Science Projects- Data Science Project Management: Agile Methodologies: Scrum, Kanban, Project Planning and Execution

UNIT IV: Data-Driven Decision Making and Model Integration**10 Hours**

Data-Driven Decision Making, Model Integration into Software Applications, Performance Metrics and Evaluation, Case Studies- Practical Applications in Software Engineering- Implementing Data Science Solutions in Real-World Software Projects- Tools and Technologies- Hands-On Projects using Weka.

UNIT V: Advanced Topics**15 Hours**

Cutting-Edge Methods and Technologies - Recent Trends in Data Science- Emerging Technologies- Predictions for the Future- Adapting to Changing Requirements- Testing Your Code- Design and Refactoring, Documentation, APIs, Automation and Deployment

Text Books

- Pressman, Roger, S., & Maxim, B.R. (2020). Software Engineering: A Practitioner's Approach (9th Ed.). McGraw
- Roger D. Peng and Elizabeth Matsui(2013)."The Art of Data Science",Leanpub.
- Catherine Nelson(2024), Software Engineering for Data Scientists, O'Reilly Media, Inc.

Reference Book

- Dr. Anand Nayyar. (2019). *Instant Approach to Software Testing: Principles, Applications, Techniques, and Practices*.
- Sommerville, Ian. (2011). *Software Engineering (9th Ed.)*. Pearson

e-Resources

- <https://livebook.manning.com/book/software-engineering-for-data-scientists/chapter-2/v-5/11>
- <https://www.d.umn.edu/~gshute/softeng/principles.html>
- <https://www.theforage.com/blog/careers/data-science-vs-software-engineering>
- <https://codecademy.com/learn/paths/software-engineering-for-data-scientists>
- <https://www.simplilearn.com/tutorials/programming-tutorial/data-science-vs-software-engineering>
- <https://www.datacamp.com/courses/software-engineering-principles-in-python>

COURSE OUTCOMES

Cos	On the successful completion of the course, students will be able to	Blooms Level
CO1	Describe and explain key principles of software engineering.	K1, K2
CO2	Apply various software life cycle models to guide and manage software development processes.	K3
CO3	Utilize requirements engineering techniques to effectively gather, document, and analyze requirements.	K4
CO4	Develop high-quality software by adhering to established best practices and standards.	K5
CO5	Implement appropriate testing methodologies to ensure and enhance software quality.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation – 76.6% Moderate Correlation – 23.3% Low Correlation – 0%

WEB APPLICATION DEVELOPMENT-PRACTICALS

PCSE101

Semester	:I	Credit	:1
Category	: Skill Enhancement Course (Non Major Elective)	Hour/Week	:3
Class &Major	:PG&NME	Total Hour	:39

COURSE OBJECTIVES

Co.No	To enable the students
CO1	Understand the fundamental concepts and role of Web Technology
CO2	Impart Practical Training in Control panel tools.
CO3	Familiarize with HTML Tags
CO4	Provide knowledge on working with events and methods
CO5	Build programs using Java script.

LIST OF PROGRAMS

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the Text boxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textbox has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form using registration Form. Write JavaScript code to display the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.

5. Write a JavaScript code to design the contact form.
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
 - (a)The first multiple choice list, displays the Major dishes available.
 - (b)The second multiple choice list, displays the Starters available.
 - (c)The single choice list, displays the Soft drinks available

COURSE OUTCOMES:

CO.No	On completion of the course, students will be able to	Blooms Level
CO1	Recall all the Basic tools in Webpage.	K1,K2
CO2	Apply various effects on webpage.	K3
CO3	Analyze the use of java script and html code.	K4
CO4	Estimate the user-defined functions and implement in Java script.	K5
CO5	Develop webpage using tools and techniques.	K6

CO-PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	2	3
CO4	3	3	2	2	1	3
CO5	3	3	2	3	3	2

High Correlation -66.67% Moderate Correlation –30% Low Correlation -3.33%

MOBILE APPLICATION DEVELOPMENT USING ANDROID

PCSE102/ PDSE102

Semester	:I	Credit	:1
Category	: Skill Enhancement Course (Non Major Elective)	Hour/Week	:3
Class &Major	:PG&NME	Total Hour	:39

COURSE OBJECTIVES

Co.No	To enable the students to
CO1	Equip fundamental knowledge in mobile app development using Power Apps and Android
CO2	Enable to use various UI components like buttons and checkboxes in mobile app design
CO3	Manage and share app data using Android Content Providers
CO4	Implement background tasks in mobile apps.
CO5	Provide hands-on experience in developing functional mobile applications

LIST OF PROGRAMS

1. Install the mobile development app using Microsoft power apps.
2. Create Development of Hello World Application
3. Create an Application which Deals with the Android Content Providers
4. Design a mobile app for blank page using add icon
5. Design the mobile app with radio buttons, check box and list box.
6. Design a mobile app with media item.
7. Create an Application using Android Layouts, Views and Events.
8. Design a mobile app for calendar control using popular items.
9. Write a mobile Application that creates Alarm Clock.
10. Create an Application with One-Time, Repeating Alarms, and Long-Running Background Task as Service

COURSE OUTCOMES:

CO.No	On the successful completion of the course, students will be able to	Bloom sLevel
CO1	Demonstrate the ability to install and configure mobile development environments.	K1,K2
CO2	Design and implement mobile apps with various UI elements.	K3
CO3	Create applications that effectively utilize Android Content Providers	K4
CO4	Develop mobile applications handling events and executing background tasks	K5
CO5	Build complete mobile applications integrating advanced features.	K6

CO-PSO MAPPING

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	3	2	3	2
CO3	3	3	3	3	2	3
CO4	3	3	2	2	2	3
CO5	3	3	2	3	3	2

High Correlation -66.67% Moderate Correlation -33.3% Low Correlation - 0%

MEAN STACK DEVELOPEMENT**PCSD201**

Semester : II Credit : 2
 Category : Skill Enhancement Course(Discipline) Hours/Week : 3
 Class &Major : I M.Sc Data Science Total Hours : 39

Course Objectives:

Cos	To enable the students
CO1	Define the core components and frameworks of the MEAN stack, including Node.js, Express, MongoDB, and Angular.

CO2	Explain the common architecture of the MEAN stack, including the stages of application development and hardware architecture considerations.
CO3	Implement a Node.js web architecture, build static sites with Express, create data models using MongoDB and Mongoose, and develop dynamic front-end applications with Angular.
CO4	Evaluate the management of authentication, sessions, and API security in Angular applications, and analyze the process of creating a single-page application.
CO5	Design and integrate comprehensive web applications using the MEAN stack, including the development of forms, custom directives, modules, controllers, and the implementation of CRUD operations in MongoDB.

UNIT- I INTRODUCTION

10 Hours

Introduction to Node.js - Introducing Express- the frame work – introducing MongoDB- Introducing Angular – supporting cast.

UNIT- II DESIGNING MEAN STACK ARCHITECTURE

9 Hours

A common mean stack architecture – designing a flexible mean architecture – planning a real application – breaking the development in to stages – Hardware architecture

UNIT- III BUILDING A NODE WEB ARCHITECTURE

5 Hours

Creating and setting up mean architecture – building static site with nodes and express – building a data model with MongoDB and MONGOOSE

UNIT- IV ADDING A DYNAMIC FRONT WITH ANGULAR

10 Hours

Creating an angular application with type script – building a single page application with angular foundation-building single page application with angular- managing authentic user, managing sessions and securing APIs – using an authentic API in angular application.

UNIT -V DATA MODELS

5 Hours

Designing the Database – Building Indexes – Inserting Data – Querying for Data

Component III & IV: Problem Solving

1. Develop a Form and validate using Angular JS
2. Create and implement modules and controllers in Angular JS
3. Create and implement Custom directives
4. Front End and Back End applications.
5. Create web applications using Express, Node JS and Angular JS
6. Form Handling with Express
7. Implement CRUD operations in MONGODB
8. Implement MongoDB data models

Text Books

- Simon Holmes (2022), Getting MEAN with Mongo, Express, Angular, and Node, Clive Herber, Manning Publications
- Agus Kurniawan(2014)–“AngularJS Programming by Example”, First Edition, PE Press.
- David Hows, Peter Membrey, Eelco Plugge (2014) – “MongoDB Basics”, Apress, 2014.
- Ethan Brown,(2014), “Web Development with Node and Express”, Oreilly Publishers, First Edition.

Reference Books

- Colin J Ihrig, Adam Bretz (2015), Full Stack JavaScript Development With MEAN MongoDB, Express, AngularJS, and Node.JS SitePoint Pty, Limited

e-Resources

- <https://www.geeksforgeeks.org/introduction-to-mean-stack/><https://www.icmr.nic.in/>
- <https://www.javatpoint.com/mean-stack-tutorial>
- <https://www.sitepoint.com/introduction-mean-stack/>

COURSE OUTCOMES

COs	On the successful completion of the course, students will be able to	Blooms
CO1	Recall and understand fundamental concepts of Node.js, Express, MongoDB, and Angular, including their roles in the MEAN stack architecture.	K1, K2
CO2	Apply knowledge to build a Node.js web architecture, including creating static sites. data models with MongoDB. and setting up the MEAN stack.	K3

CO3	Analyze dynamic front-end applications using Angular, managing authentication, sessions, and securing APIs.	K4
CO4	Implement the design principles of a flexible MEAN stack architecture and plan a real application.	K5
CO5	Integrate different components of the MEAN stack effectively.	K6

CO - PSO

MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

R PROGRAMMING

PDSM204

Semester : II

Credit :2

Category : Skill Enhancement Course SEC 2 –(Discipline)

Hour/Week: 3

Class & Major : I M.Sc Data Science

Total Hour: 39

COURSE OBJECTIVES:

CO No.	To enable the students
CO1	Develop proficiency in data summarization and exploration.
CO2	Implement statistical tests such as t-tests, chi-square tests, and ANOVA to evaluate hypotheses.
CO3	Create programs to perform simple linear regression and analyze residuals.
CO4	Apply nonparametric tests and two-sample t-tests to analyze data.
CO5	Analyze time series datasets and perform residual analysis from regression models.

List of Exercise

1. Program for descriptive statistics.
2. Program to perform a t-test.
3. Program to perform a simple linear regression analysis.
4. Program to perform a chi-square test on a contingency table to test for independence.
5. Program to perform a one-way ANOVA on a given dataset.
6. Program for performing a two-sample t-test to compare means of two independent samples.
7. Program for performing nonparametric tests.
8. Program to analyze residuals from a regression model for assessing the model's adequacy.
9. Program for plotting various probability distributions.
10. Program for analyzing a time series dataset.

COURSE OUTCOMES

CO.NO	On the successful completion of the course, students will be able to	Blooms Level
CO1	Understand the concepts and methods involved in descriptive statistical tests such as t-tests and chi-square tests for data analysis.	K1,K2
CO2	Develop programs to perform simple linear regression analysis and two-	K3
CO3	Conduct one-way ANOVA and nonparametric tests to analyze various	K4
CO4	Assess the adequacy of regression models through residual analysis.	K5
CO5	Design and implement programs for plotting probability distributions and analyzing time series datasets.	K6

CO – PSO

MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	3	2	3	3

High Correlation – 70% Moderate Correlation – 30% Low Correlation – 0%

III AND IV EVALUATION OF COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Core Courses - I	PDSM101	Foundations of Data Science	Problem Solving	Prototyping
	Core Courses - II	PDSM102	Python for Data Science	Prototyping	Problem Solving
	Core Courses - III	PDSR101	Python for Data Science – Practical	DPA	Viva-voce
	Elective (Generic / Discipline Centric)-I	PDSO101	Mathematics for Data Science	Assignment	Poster Presentation
	Elective (Generic / Discipline Centric)-II	PDSM103	Information Security and Ethics	Assignment	Seminar
II	Core Courses – IV	PDSM201	Distributed Systems	Assignment	Seminar
	Core Courses – V	PDSM202	Artificial Intelligence and Machine Learning	Prototyping	Poster Presentation
	Core Courses – VI	PDSR201	Artificial Intelligence and Machine Learning - Practical using (Python/R)	DPA	Viva-voce
	Core Industry Module-I	PDSM203	Software Engineering for Data Science	Prototyping	Seminar
	Elective (Generic / Discipline Centric)-III	PDSO201	Probability and Statistical Computing	DPA	Viva-voce
	Elective (Generic / Discipline Centric)-IV	PDSM204	MEAN Stack	Assignment	Seminar
	Skill Enhancement Course SEC 2 –(Discipline)	PDSD201	R Programming	Prototyping	Problem Solving

MATHEMATICS FOR DATA SCIENCE

PDSO101

Semester : I

Credit :3

Category : Elective (Generic / Discipline Centric)-I

Hour/Week: 5

Class & Major : I M.Sc Data Science

Total Hour: 65

COURSE OBJECTIVES:

CO No.	To enable the students
CO1	Learn to perform operations involving vectors and matrices
CO2	Understand and compute the four fundamental subspaces of a matrix
CO3	Apply concepts of orthogonality, projections, and least squares approximations to solve problems in data fitting
CO4	Determine eigenvalues and eigenvectors of matrices, diagonalize matrices, and apply these concepts to solve differential equations and understand matrix transformations
CO5	Perform Singular Value Decomposition (SVD) and apply it to image processing and Principal Component Analysis (PCA), and understand linear transformations

UNIT I: Vectors and Matrices

13 Hours

Vectors and Linear Combinations-Lengths and Angles from Dot Products-Matrices and Their Column Spaces-Matrix Multiplication AB and CR Solving Linear Equations $Ax = b$ - Elimination and Back Substitution-Elimination Matrices and Inverse Matrices-Matrix Computations and $A = LU$ -Permutations and Transposes

UNIT II: The Four Fundamental Subspaces

13 Hours

Vector Spaces and Subspaces-Computing the Nullspace by Elimination: $A = CR$ -The Complete Solution to $Ax = b$ Independence, Basis, and Dimension-Dimensions of the Four Subspaces

UNIT III: Orthogonality and Determinants

13 Hours

Orthogonality of Vectors and Subspaces-Projections onto Lines and Subspaces-Least Squares Approximations-Orthonormal Bases and Gram-Schmidt-The Pseudo inverse of a Matrix 3 by 3 Determinants and Cofactors-Computing and Using Determinants-Areas and Volumes by Determinants

UNIT IV: Eigenvalues and Eigenvectors

13 Hours

Diagonalizing a Matrix-Symmetric Positive Definite Matrices-Complex Numbers and

Vectors and Matrices-Solving Linear Differential Equations

UNIT V: The Singular Value Decomposition (SVD) and

Linear Transformations

13 Hours

Singular Values and Singular Vectors-Image Processing by Linear Algebra-Principal Component Analysis (PCA by the SVD). The Idea of a Linear Transformation-The Matrix of a Linear Transformation.

Text Book:

- Strang, G. (2023). *Introduction to linear algebra* (6th ed.). Wellesley - Cambridge Press.

Reference Books

- Lay, D., Lay, S. & McDonald, J. (2014). *Linear algebra and its applications* (5th Ed.). Pearsons.
- Axler, S. (2015). *Linear algebra done right (Undergraduate Texts in Mathematics)* (3rd ed.). Springer.
- Hefferon, J. (2020). *Linear algebra* (4th ed.). Orthogonal Publishing L3c
- Philips, J. M. (2021). *Mathematical foundations for data analysis* (1st ed.). Springer Nature Switzerland AG.

e-resources

- <https://joshua.smcvt.edu/linearalgebra/>

COURSE OUTCOME

CO.NO	On the successful completion of the course, students will be able to	Bloom's level
CO-1	Recall and reproduce fundamental mathematical concepts relevant to data science and explain the underlying principles of mathematical techniques and interpret various fundamental subspaces.	K1, K2
CO-2	Apply and utilize eigenvalue and eigenvector concepts to analyze the behavior of linear transformations and diagonalize matrices.	K3
CO-3	Analyze and evaluate different linear transformations in terms of their effects on vector spaces and subspaces.	K4

CO-4	Evaluate the impact of linear transformations on data quality, interpretability, and computational complexity in various datascience scenarios.	K5
CO-5	Formulate creative solutions by applying mathematical techniques to optimize linear transformations and matrix operations in data science applications.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

PROBABILITY AND STATISTICAL COMPUTING PDS0201

Semester : II

Credit :3

Category : Elective (Generic / Discipline Centric)-III

Hour/Week: 4

Class & Major : I M.Sc Data Science

Total Hour: 52

COURSE OBJECTIVES:

CO No.	To enable the students
CO1	Understand and apply various sampling techniques and methods for data classification
CO2	Calculate and interpret correlation coefficients, including Karl Pearson's and rank correlation, for understanding relationships between variables
CO3	Understand fundamental probability concepts, including random experiments, sample spaces, and events

CO4	Compute and apply distribution functions, probability mass functions, probability density functions, and characteristic functions to analyze and model random variables.
CO5	Compute recurrence relationships, moment-generating functions, and generating functions to solve practical problems and model real-world phenomena using these distributions.

UNIT-I

10 Hours

Sampling Techniques – Data Classification – Tabulation – Frequency and graphic Representation – Measures of Central Tendency – Measures of Variation – Quartiles and Percentiles – Moments - Skewness and Kurtosis.

UNIT-II

11 Hours

Scatter Diagram – Karl Pearson’s Correlation Coefficient – Rank Correlation – Correlation Coefficient for Bivariate Frequency Distribution – Regression Coefficients – Fitting of Regression Lines.

UNIT- III

10 Hours

Random Experiment – Sample Space – Events – Axiomatic Definition of probability – Addition Theorem– Multiplication Theorem – Baye’s Theorem- Applications.

UNIT-IV

10 Hours

Continuous and Discrete Random Variables – Distribution Function of a Random Variable – Probability Mass Functions and Probability Density Functions – Characteristic Functions – Central Limit Theorems.

UNIT-V

11 Hours

Probability Distributions – Recurrence Relationships – Moment Generating Functions – Generating Functions – Continuous Probability Distributions - Binomial Distribution – Poisson Distribution – Continuous Probability Distributions – Uniform Distribution - Normal Distribution –Exponential Distribution.

Text Books

- Gupta,S.C.and Kapoor,V.K.,(2002), “Fundamentals of Mathematical Statistics”, Sultan & Chand & Sons, New Delhi, 11th Ed.,
- Hastie, Trevor, et al. (2009), “The elements of Statistical Learning”, Springer.
- Ross, S.M.,(2011), “Introduction to Probability and Statistics”, Academic Foundation.
- Papoulis,A. and Pillai, S.U.,(2010), “Probability, Random Variables and Stochastic Processes”, TMH.

e-Resources

- https://onlinecourses.nptel.ac.in/noc22_mg87/preview
- <https://www.udemy.com/tutorial/learn-probability-concepts-and-counting-techniques-sample-space-sample-points-and-events/>
- <https://www.udemy.com/tutorial/learn-probability-concepts-and-counting-techniques/concepts-sample-space-sample-points-and-events/>

COURSE OUTCOMES

CO No.	On the successful completion of the course, students will be able to	Blooms Level
CO-1	Understand the concepts of descriptive Statistics and definitions	K1, K2
CO-2	Problems in correlation and regression and its interpretation	K3
CO-3	Apply the concepts of Probability and their applications	K4
CO-4	Examine the concepts of discrete and continuous distribution functions	K5
CO-5	Develop an application of suitable probability distribution for a given problem situation	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

OPEN SOURCE TECHNOLOGY

PDSS301

Semester	:III	Credit	: 1
Category	: self study paper	Hours/Week	: 2
Class & Major	: I M.Sc Data Science	Total Hours	: 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO1	Understand and apply fundamental PHP concepts including variables, statements
CO2	Create and manipulate arrays in PHP, including single-dimensional and multi-dimensional arrays
CO3	Design and develop web applications using PHP by merging forms with conditional statements, processing user input, and creating dynamic web pages
CO4	Establish and manage MySQL connections, and design databases and tables using various MySQL data types. Perform CRUD operations
CO5	Implement set operators and full-text searching to efficiently retrieve and analyze data from MySQL databases.

UNIT – I INTRODUCTION

8 Hours

Introduction- Open source-PHP – History – evolution – walkthrough – forms –Database – Graphics- Language Basics

UNIT – II ARRAYS AND FUNCTIONS

9 Hours

Arrays: Creating an array – Modifying array – Processing array – Grouping form with arrays – Using array functions – Creating user defined functions – Using files – Sessions – Cookies – Executing external programs – Creating sample applications using PHP.

UNIT – III MYSQL

9 Hours

Effectiveness of MySQL – MySQL Tools – Prerequisites for MySQL connection – Databases and tables – MySQL data types – Creating and manipulating tables – Insertion, updation and deletion of rows in tables – Retrieving data – Sorting and filtering retrieved

data – Advanced data filtering – Data manipulation functions – Aggregate functions – Grouping data – Sub queries – Joining Tables – Set operators – Full text searching.

Text Books

- Kevin Tatroe (2020),”PHP programming ”, 4th edition, Shroff/O'Reilly
- Margerum, C. (2021). Learn MYSQL: Learn MYSQL For Beginners: Learn How To Create An Address Book Using Php And Mysql. (n.p.): Independently Published.
- Vikram Vaswani , (2005). PHP and My SQL. Tata McGraw-Hill.
- Duckett, J. (2022). PHP & MySQL: Server-side Web Development. Germany: Wiley.

Reference Books

- Tim Converse, Joyce Park and Clark Morgan, (2008). *PHP 5 and MySQL*. Wiley India reprint.
- Robert Sheldon, Geoff Moes , (2005). *Beginning MySQL*. Wrox.
- Ben Forta, (2006). *MySQL Crash course* .SAMS.
- Dan Wellman, (2008). *jQuery UI 1.8: The User Interface Library for jQuery*. Packt Publishing. Brimingham–Mumbai.
- Rebecca Murphey , (2009). *jQuery Fundamentals*. Superhero Labs Publisher. (1st ed.,).

E-Resources

- <http://www.w3schools.com>
- <http://www.youtube.com>
- <https://www.techopedia.com>

COURSE OUTCOMES

CO No.	On the successful completion of the course, students will be able to,	Bloom’s Level
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CO-1	Recall the fundamental concepts of PHP, including its history, evolution, and basic language features and Explain the usage and functionalities of arrays and functions in PHP, including how they interact with forms,	K1, K2
CO-2	Create and modify PHP arrays, functions, and sample applications, utilizing user-defined functions and managing files and sessions.	K3
CO-3	Analyze MySQL tools and data types, and understand how to create, manipulate, and query MySQL databases and tables.	K4
CO-4	Assess the effectiveness of MySQL queries and operations, including advanced filtering, sorting, and joining tables.	K5
CO-5	Develop complete PHP and MySQL applications, integrating arrays, functions, and database operations to solve real-world problems.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

DEVOPS

PDSS401

Semester :IV

Credit : 1

Category : self study paper

Hours/Week : 2

Class & Major : I M.Sc Data Science

Total Hours : 26

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the essentials of DevOps, including its principles and practices and tools
CO-2	Learn about the Maven build lifecycle, including its phases

CO-3	Implement configuration management using Ansible. Install and configure Ansible, and develop a basic understanding of its components such as YAML basics
CO-4	Create and manage DevOps pipelines using Azure DevOps. Set up GitHub accounts and repositories
CO-5	Integrate various DevOps tools and practices to streamline development, deployment, and operations.

UNIT – I INTRODUCTION TO DEVOPS

8 Hours

Overview of DevOps Practices - Tools Vision and visualization- DevOps readiness assessment- DevOps practices – implementation- Continuous Planning – Benefits- Outcome- best practice – continuous code inspection – continuous integration – continuous delivery and deployment – continuous testing and monitoring – continuous feedback – improvement/innovation -

UNIT – II CONFIGURATION MANAGEMENT USING ANSIBLE

9 Hours

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible

UNIT – III BUILDING DEVOPS PIPELINES USING AZURE

9 Hours

Create Github Account, Create Repository, and Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file

Text Books

- Soni, M. (2020). Hands-on Azure DevOps: CICD Implementation for Mobile, Hybrid, and Web Applications Using Azure DevOps and Microsoft Azure. BPB Publications.
- Roberto Vormittag (2016). “A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises”, Second Edition, Kindle Edition.
- Jason Cannon (2014). “Linux for Beginners: An Introduction to the Linux Operating System and Command Line”, Kindle Edition.

Reference Book

- Mitesh Soni(1 January 2020), “Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure”, (English Edition) Paperback
- Jeff Geerling (2015.), “Ansible for DevOps: Server and configuration management for humans”, First Edition.

- David Johnson (2016.), “Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps”, Second Edition.
- Mariot Tsitoara (2019.), “Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer”, Second Edition.

E-Resource:

- <https://www.jenkins.io/user-handbook.pdf>.
- <https://maven.apache.org/guides/getting-started/>

COURSE OUTCOMES:

CO No.	On completion of the course, the student will be able to	Bloom’s Level
CO-1	Recall and explain the fundamental concepts of DevOps practices, including continuous integration, delivery, and deployment.	K1,K2
CO-2	Implement configuration management using Ansible, including setting up Ansible environments and creating playbooks.	K3
CO-3	Analyze the effectiveness of DevOps practices by evaluating their implementation and identifying areas for improvement.	K4
CO-4	Assess the configuration of build pipelines using Azure DevOps, including creating and modifying pipelines.	K5
CO-5	Develop and deploy a complete DevOps pipeline, integrating tools and practices to ensure continuous improvement and innovation.	K6

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	2
CO2	3	3	3	3	3	2
CO3	3	3	3	3	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

HIGH CORRELATION - 76.6% MODERATE CORRELATION - 23.3% LOW CORRELATION - 0%

DEPARTMENT OF PSYCHOLOGY

PREAMBLE

UG: Programme Profile and the Syllabi of Courses Offered in the III & IV Semester along with Evaluation Components III & IV (With effect from 2023 - 2024 Batch Onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Programme Specific Outcomes <i>Upon completion of these courses the student would be able to</i>
PSO-1	Identify the major historical frameworks that shaped the development of psychology, including Structuralism, Functionalism, Behaviourism, and Psychoanalysis.
PSO-2	Understand the psychological processes influencing human behaviour and develop critical thinking skills enhances one's comprehension of the cognitive mechanisms that shape individuals' actions and reactions.
PSO-3	Apply key psychological concepts, theoretical perspectives, and by carrying out hands-on activities and showcasing how these ideas are applied in real-world situations.
PSO-4	Analyse the essence of human values by critically examining acts of social commitment, and assess the development of professional ethics and responsibilities.
PSO-5	Evaluate the behavioural concepts in both laboratory settings and real-life situations.
PSO-6	Develop and acquire skills in psychological assessment and Progress on the career path of higher studies, psychological services in the community, and research.

PROGRAMME PROFILE B.Sc. Psychology

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit Min/Max
I	I	Tamil / Hindi / French	UTAL110/ UHIL110/ UFRL110	General Tamil- I/ Hindi -I / French- I	5	3
	II	English	UENL111	General English – I	5	3
	III	Core Course I	UPSM101	Introduction to Psychology- I	5	4
		Core Course II	UPSM102	Biological Psychology	5	4
		Elective Course I	UPSO101	Building Psychological Capital	4	3
		SEC I (NME)			2	2
	IV	Foundation Course	UPSF101	Careers and Ethics in Psychology	2	2
		AECC I (Soft Skill-I)	USKS103		2	2
TOTAL					30	23
II	I	Tamil / Hindi / French	UTAL210/ UHIL210/ UFRL210	General Tamil – II / Hindi -II / French- II	5	3
	II	English	UENL211	General English – II	5	3
	III	Core Course III	UPSM201	Introduction to Psychology-II	5	4
		Core Course IV	UPSM202	Psychology of Childhood	5	4
		Elective Course II	UPSO201	Cross-Cultural Psychology	4	3
	IV	SEC II (NME)			2	2
		SEC III (Discipline Specific)	UPSD201	Psychological First Aid	2	2
		AECC II (Soft Skill-II)	USKS203		2	2
		III	Internship	UINS201		-	-/2
	V	Extension Activity / Physical Education			-	½
	VI	Value Added Course			-	-/2
TOTAL					30	24/29
III	I	Tamil / Hindi / French	UTAL310/ UHIL310/ UFRL310	General Tamil – III / Hindi -III / French- III	5	3
	II	English	UENL311	General English – III	5	3
	III	Core Course V	UPSM301	Psychology of Adolescence and Early Adulthood	4	4
		Core Course VI	UPSM302	Social Psychology-I	4	4

		Elective Course III	UPSO301	Statistics for Behavioural Science	4	3
	IV	SEC IV (Entrepreneurship)	UPSU301	Managing Behaviour in Organization	2	1
		SEC V (Discipline Specific)	UPSD302	Relaxation Techniques	2	2
		AECC III (Soft Skill-III)			2	2
		Value education			2	2
TOTAL					30	24
IV	I	Tamil / Hindi / French	UTAL410/ UHIL410/ UFRL410	General Tamil – IV / Hindi -IV / French- IV	5	3
	II	English	UENL411	General English – IV	5	3
	III	Core Course VII	UPSM401	Psychology of Middle Age and Old Age	5	4
		Core Course VIII	UPSM402	Social Psychology II	5	4
		Elective Course IV	UPSO401	Introduction to Research Methodology	4	3
	IV	NME – Online Course*			2	2
		SEC VII (Discipline Specific)	UPSD402	Personality Development	2	2
		AECC IV (Soft Skill-IV)			2	2
	III	Internship	UINS401		-	-/2
	V	Extension Activity / Physical Education			-	-/2
	VI	Value Added Course			-	-/2
TOTAL					30	23/29
V	III	Core Course IX	UPSM501	Psychopathology I	5	4
		Core Course X	UPSM502	Cognitive Psychology	5	4
		Core Course XI	UPSM503	Assessments in Psychology	5	4
		Major Elective I	UPSO501	Organisational Psychology	5	3
		Major Elective II	UPSO502	Counselling Psychology	4	3
		Core Course XII	UPSP501	Project	4	4
	IV	Environmental Studies			2	2
TOTAL					30	24
VI	III	Core Course XIII	UPSM601	Psychopathology II	5	4
		Core Course XIV	UPSM602	Educational Psychology	5	4
		Core Course XV	UPSM603	Health Psychology	5	4
		Major Elective VII	UPSO601	Sports and Exercise Psychology	6	4

	Major Elective VIII	UPSO602	Environmental Psychology	5	3
	Comprehensive Viva-voce	UPSM604		-	1
IV	Professional Competency Skill	UPSC601		4	2
III	Internship	UINS601		-	-/2
V	Extension Activity			-	-/2
VI	Value Added Course			-	-
TOTAL				30	22/26
GRAND TOTAL				180	140/155

PSYCHOLOGY OF ADOLESCENCE AND EARLY ADULTHOOD

UPSM301

Semester : III
Category : Major Core V
Class & Major : II B.Sc. Psychology

Credit : 4
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Articulate the physical, emotional, and social changes associated with adolescence.
CO-2	Demonstrate knowledge of vocational and family adjustments in early adulthood.
CO-3	Analyse the changes in morality and family relationships during adolescence.
CO-4	Examine the developmental tasks and challenges of early adulthood.
CO-5	Evaluate cognitive development in adolescence, including Piaget's formal operational stage and Elkind's characteristics of adolescent thought.

UNIT I – ADOLESCENCE

10 Hours

Characteristics of adolescence - Developmental tasks - Physical changes - Emotionality during adolescence - Social changes during adolescence – Problems faced by Adolescents - Adolescent interests.

UNIT II – ADOLESCENT BEHAVIOUR

10 Hours

Changes in morality during adolescence - Sex interest and sex behaviour during adolescence - Approved sex roles – Sex Role Adjustment - Family relationships during adolescence.

UNIT III – EARLY ADULTHOOD

10 Hours

Characteristics of early adulthood - Developmental tasks - Changes in interests - Social mobility - Sex role adjustment - Personal and social hazards.

UNIT IV – VOCATIONAL AND FAMILY ADJUSTMENTS IN EARLY ADULTHOOD

10 Hours

Vocational adjustments, Marital adjustments - Adjustment to parenthood - Adjustment to singlehood - Hazards of vocational and marital adjustments – Altruism.

UNIT V – COGNITION AND PERSONALITY

12 Hours

Cognitive Development - Piaget's Formal operational stage - Elkind's Immature characteristics of Adolescent thought - Shift to postformal thought - Schaie's Life-span model of Cognitive development - Personality - Freud's genital stage - Erikson's Identity Vs Confusion.

Text Book

- Papalia D. E, Olds S. W.& Feldman R.D. (2004) *Human Development* (9thEd.) Chennai: McGraw-Hill Education (India) Private Limited.
- Santrock J.W. (2011) *Life-Span Development* (13th Ed.) New Delhi: Tata McGraw Education Private Limited.

Reference Books

- Shaffer D.R. (1996) *Developmental Psychology – Childhood and Adolescence* (4th Ed.) California: Brooks/Cole Publishing Company.
- Sigelman C.K. & Shaffer D.R. (1995) *Life span Development* (2nd Ed.) California: Brooks/Cole Publishing Company.
- Hurlock E.B. (2010) *Developmental Psychology: A Life Span Approach*, Tata McGraw, Hill Education Pvt Ltd
- Santrock J.W. (2007) *Adolescence* (11thEd.) New Delhi: Tata McGraw-Hill Publishing Company Limited.

e-Resources

- <https://www.psychologytoday.com/us/basics/adolescence>
- <https://courses.lumenlearning.com/wm-lifespandevelopment/chapter/moral-development-during-adolescence/>
- <https://www.psychologytoday.com/us/blog/brain-reboot/202101/what-is-social-safety>
- <https://conicklaw.com/social-security-disability-what-is-a-vocational-adjustment/>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Define the key characteristics of adolescence, including physical changes, emotional fluctuations, and social challenges.	K1
CO-2	Demonstrate the changes in morality and family relationships during adolescence.	K2
CO-3	Apply the principles of early adulthood development, integrating knowledge of social mobility and personal challenges.	K3
CO-4	Analyse the vocational and family adjustments in early adulthood.	K4
CO-5	Point out the consequences of vocational and family adjustments in early adulthood.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	1	1	0
CO2	3	3	2	2	0	0
CO3	3	3	2	2	1	1
CO4	3	3	3	2	2	2
CO5	3	3	3	3	3	2

High Correlation:47% **Medium Correlation:**30% **Low Correlation:**13% **No Correlation:**10%

SOCIAL PSYCHOLOGY I

UPSM302

Semester : III
Category : Major Core VI
Class & Major : II B.Sc. Psychology

Credit : 4
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Explain the fundamental concepts and historical milestones in social psychology.
CO-2	Interpret various research methods used in social psychology.
CO-3	Identify real-world examples of cognitive biases and errors in social cognition.
CO-4	Compare different theories of attribution in social perception.
CO-5	Integrate knowledge of attitudes, persuasion, and cognitive dissonance to formulate strategies for effectively managing and changing attitudes.

UNIT I – INTRODUCTION TO SOCIAL PSYCHOLOGY

10 Hours

Definition of Social Psychology – History - Research methods in Social Psychology - Social Psychology in new millennium.

UNIT II – SOCIAL COGNITION

10 Hours

Definition of social cognition; Schemas – Meaning - Impact of schemas on social cognition - Schema persistence; Heuristics – Representativeness - Anchoring and adjustment; Potential sources of error in social cognition.

UNIT III – SOCIAL PERCEPTION

10 Hours

Definition of social perception; Non-verbal communication – Basic channels; Deception – Meaning. Non-verbal cues to identify deception; Attribution – Definition, Theories of attribution– Correspondent inference, Kelley’s theory of causal attribution; Basic sources of error in attribution, Impression formation and Impression management.

UNIT IV – ATTITUDES

10 Hours

Attitudes – Meaning, Types, Formation of attitudes – Classical conditioning, Instrumental conditioning, Observational learning; Strength of attitudes, Change in attitude – Persuasion - cognitive processes underlying persuasion - Resisting persuasion attempts - Cognitive dissonance - Dissonance and attitude change.

UNIT V – INTERPERSONAL ATTRACTION AND CLOSE RELATIONSHIPS 12 Hours

Meaning of interpersonal attraction - Internal determinants of attraction - External determinants of attraction; Romantic relationships and falling in love – Romance - Selecting a potential mate – Jealousy - Marital happiness - Causes of relationship failure.

Text Books

- Baron R.A. & Byrne D. (2014) *Social Psychology* (13th Ed.) Prentice-Hall of India.
- Myers D.G. (2012) *Social psychology* (11th Ed.) New York, NY: McGraw.

Reference Books

- Winnicott, D.W. (1995). *Counselling and Therapy*. London: Sage Publications
- Whiston, S.C (1999). *Principles and applications of assessment in counselling*. Wadsworth, Belmont. Brooks- Clole
- Nichols, M.P. & Schwartz, R.C. (2010). *Family therapy: Concepts and methods*. 9th ed.Toronto: Allyn and Bacon, Pearson education, Inc.Press, Inc
- Patterson, J., William, L., Grauf-Grounds, C., &Chamow. (2009). *Essential skills in family therapy: From the first interview to termination*. 2nd Edition. New York: The Guilford Press.

e-Resources

- Journal of Social and Political Psychology (<https://jspp.psychopen.eu/index.php/jspp>)
- International Review of Social Psychology (<https://www.rips-irsp.com/about/>)
- https://us.sagepub.com/sites/default/files/upm-binaries/90582_ch_1_heinzen.pdf
- <https://www.blackwellpublishing.com/content/hewstonesocialpsychology/chapters/cpt3.pdf>
- <https://opentextbc.ca/socialpsychology/chapter/changing-attitudes-by-changing-behavior/>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Describe the fundamental concepts and milestones in social psychology.	K1
CO-2	Interpret the significance of diverse research methods in social psychology.	K2
CO-3	Apply social cognitive concepts, such as schemas and heuristics, to real-world social scenarios.	K3
CO-4	Assess the impact of non-verbal communication on social perception	K4
CO-5	Distinguish strategies for influencing and changing attitudes in a variety of social contexts.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	1	0
CO2	3	2	2	2	1	0
CO3	3	2	3	2	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	3	2

High Correlation:43% Medium Correlation:43% Low Correlation:7% No Correlation:7%

STATISTICS FOR BEHAVIOURAL SCIENCE

UPSO301

Semester : III
Category : Elective III
Class & Major : II B.Sc. Psychology

Credit : 3
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand basic statistical concepts.
CO-2	Learn of qualitative data and its application in research.
CO-3	Gain insight into parametric analysis.
CO-4	Comprehend Non parametric analysis and tests.
CO-5	Apply statistical methods using software.

UNIT I – BASIC STATISTICAL CONCEPTS

10 Hours

Definition of basic concepts - Variables and constants - Meaning of variable, constant, discrete variable, continuous variable - Mean, median and mode - effects of score transformations characteristics of random sampling distribution.

UNIT II – ORGANIZING QUANTITATIVE DATA

10 Hours

Frequency distribution - Percentiles and Percentile ranks - Graphical representation of frequency distribution - Measure of variability – Measure of Central Tendency.

UNIT III – PARAMETRIC ANALYSIS - BASIC CONCEPTS AND ASSUMPTIONS

10 Hours

Correlation – Pearson Correlation - Basics of regression - t distribution - degrees of freedom - One way analysis of variance- within group and between group variations - ANOVA for repeated measures – f test.

UNIT IV – NON-PARAMETRIC ANALYSIS - ASSUMPTION - FREE TESTS **10 Hours**

Randomization tests- rank order test - Sign test - Wilcoxon's signed - ranks test Kruskal - Wallis test - Friedman's rank test

UNIT V – STATISTICAL METHODS USING SOFTWARE **12 Hours**

Jamovi - SPSS data editor - SPSS viewer - Importing and exporting data - Alternatives to SPSS - data entry in SPSS - Assigning a variable naming - Sorting the data type - Defining variable table - Software for qualitative data analysis.

Text Books

- King, B.M. and Minium E W. (2011). Statistical Reasoning in the Behavioural Sciences. 5th Edition. New Delhi: Wiley student India edition.
- Aron A, Aron E N and Coups E J. (2007) . Statistics for Psychology. New Delhi: Pearson Education.

Reference Books

- Frederick, J.G, & William, L.B. (2007). Statistics for Behavioural Sciences. (7th Ed.). Thomson Wadsworth.
- Kothari, C. R. (2008). Research Methodology: Methods and Techniques. (2nd Ed.). New Age International. 1.
- Argyrous, G. (2011). Statistics for research. New Delhi: Sage South Asia edition.
- Gaur A S and Gaur SS (2009). Statistical methods for practice and research. A guide to data analysis using SPSS. 2nd edition. New Delhi: Response - Sage publication.

e-Resources

- <https://studymat.in/basic-concepts-in-statistics/>
- <https://www.aureliuslab.com/how-to-organize-qualitative-research>
- <https://www.ibm.com/docs/en/db2woc?topic=procedures-statistics-parametric-nonparametric>
- https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_nonparametric/bs704_nonparametric_print.html
- <https://www.g2.com/categories/statistical-analysis>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Describe the fundamental statistical concepts.	K1
CO-2	Demonstrate different types of variables and their implications in statistical analysis.	K2
CO-3	Utilize statistical software tools to conduct data analysis and interpret outcomes.	K3
CO-4	Analyse statistical relationships through the application of correlation, regression, and ANOVA.	K4
CO-5	Explain the practical applications of statistical measures of central tendency and variability.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	1	1	0
CO2	3	2	2	1	1	0
CO3	3	2	2	2	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	3	2

High Correlation: 40% **Medium Correlation :** 40% **Low Correlation:** 13% **No Correlation :** 7%

MANAGING BEHAVIOUR IN ORGANIZATION

UPSU301

Semester : III
Category : Skill Enhancement Course
Class &Major : II B.Sc. Psychology

Credit : 1
Hours / Week : 2
Total Hours : 26

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Articulate the fundamental concepts of Organizational Behaviour.
CO-2	Identify potential challenges in the organizational decision-making process.
CO-3	Compare and contrast different organizational cultures.
CO-4	Apply personality assessment tools (MBTI, Big Five).
CO-5	Analyse the implications of culture on individual behaviour and organizational outcomes.

UNIT- I FUNDAMENTALS OF ORGANIZATIONAL BEHAVIOUR

5 Hours

Definition & Importance - Nature and Scope- Emergence of OB - Contributing fields to OB - Models of OB – Autocratic- Custodial- Supportive- Collegial - SOBC.

UNIT- II ORGANIZATIONAL DECISION MAKING

5 Hours

Definition, Nature of Decision Making: Decision Characteristics- Types of Decisions. Decision Making Process- Problems in Decision Making Process.

UNIT- III ORGANIZATIONAL CULTURE

5 Hours

What is Organizational Culture: Definition – Concept – Characteristics- Elements of Culture- Implications of Organizational Culture- Process of Organizational Culture – Organizational Climate – Difference between Climate and Culture.

UNIT- IV PERSONALITY, VALUES AND PERCEPTION

5 Hours

Personality – Definition; Traits relevant to OB- Application of MBTI and Big Five in organizations Values – Importance; Terminal Vs Instrumental; Generational Personality and Values at Work place Perception – Definition; Person perception; Perception and Individual Decision Making

UNIT-V ORGANISATIONAL STRESS

6 Hours

Work place stress: Meaning of Job Stress-Definition Burnout- Background of stress. Causes of Stress: Individual- Group – Organizational - Extra organizational Stress – Occupational Stress – Coping Style.

Text Books

- Luthans, F. (2002). Organizational Behavior. New York: Mcgraw-Hill Inc.
- Robbins, S.P. (2004). Organizational Behavior - Concepts, Controversies and Applications. New Delhi: Prentice Hall of India.

Reference Books

- Moorhead, G., and Griffin, R.W. (1989). Organizational Behavior. Boston: Houghton Mifflin Company.
- Gupta.S.K and Joshi.R (2010). Organizational behaviour, Kalyani Publishers (7th edition)
- Davis, Keith (2002). Organizational Behavior: Human Behavior at work. (11th ed.). Mc. Graw Hill.
- Gordon, J.R. (1991). A Diagnostic approach to Organizational Behavior. 1991. Boston: Allyn and Bacon.
- Singh, K. (2013). Organizational Behaviour. India: Dorling Kindersley Pvt. Ltd.

e-Resource

- <https://www.iedunote.com/fundamental-concepts-of-organizational-behavior>
- <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-decision-making>
- <https://www.indeed.com/career-advice/career-development/organizational-culture>
- <https://open.lib.umn.edu/principlesmanagement/chapter/2-3-personality-and-values-3/>
- <https://www.geektonight.com/org>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Describe the concept of industrial and organizational psychology.	K1
CO-2	Explain job profile, job analysis, recruitment techniques, and employee training.	K2
CO-3	Identify and classify the appraisal rating system.	K3
CO-4	Scrutinize the impact of organizational culture on behaviour.	K4
CO-5	Estimate strategies for alleviating workplace stress.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	1	1	0
CO2	3	2	2	1	1	0
CO3	3	3	2	2	1	1
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2

High Correlation: 47% Medium Correlation : 27% Low Correlation:20% No Correlation : 6%

RELAXATION TECHNIQUE

UPSD302

Semester : III
Category : Skill Enhancement Course
Class & Major : II B.Sc. Psychology

Credit : 2
Hours / Week : 2
Total Hours : 26

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the term 'stress' and its emotional basis.
CO-2	Incorporate strategies to overcome stress.
CO-3	Identify the cognitive aspects of stress.
CO-4	Analyze various factors related to health and diseases.
CO-5	Demonstrate the quality of life and promote health.

UNIT I – THE BOTTOM LINE

5 Hours

What are Relaxation Techniques – The Importance of Practice – Effectiveness of Relaxation Techniques.

UNIT II – STRESS VERSUS RELAXATION

5 Hours

Stress - Outline psychological & physiological mechanisms of relaxation – Importance of Relaxation in health – Mental Mechanism – Defence Mechanism.

UNIT III – CURRENT RESEARCH IN PSYCHONEUROIMMUNOLOGY AND RELAXATION THERAPY

5 Hours

Define and Outline PNI – Current, leading research in PNI and Relaxation – Effects of Relaxation in conditions such as anxiety, depression and pain.

UNIT IV – EXPERIENCE, PRACTICE AND TEACH RELAXATION

5 Hours

Gain personal experience of relaxation and its' benefits - Practice relaxation regularly - Develop proficiency to teach relaxation to patients and clients.

UNIT V – CLINICAL CONSIDERATIONS OF RELAXATION THERAPY

6 Hours

Contraindications and cautions - Pain Management - Complementary Therapy - Patient Compliance.

Text Book

- Goldberger, L, Breznitz, S (Eds): (1993) The Handbook of Stress, Free Press, New York.
- Steptoe, A: 1997, Stress and Disease, The Cambridge Handbook of Psychology, Health and Medicine, Cambridge University Press, Cambridge, UK.

Reference Book

- Herbert Benson M.D: (1992) The Relaxation Response, Harper Collins, New York.
- Martha Davis: (2000) 5th Ed., The Relaxation & Stress Reduction Workbook.
- Dennis Greenberger and Christine Padesky: (1995) Mind Over Mood, The Guilford Press, New York, USA.
- Rudolph H Moos & Jeanne A Schaefer: (1993) Coping Resources and Processes: Current Concepts and Measures, Handbook of Stress (Eds: Leo Goldberger and Shlomo Breznitz), The Free Press, Toronto, Canada.

e-Resource

- <https://www.nccih.nih.gov/health/relaxation-techniques-what-you-need-to-know>
- <https://www.health.harvard.edu/mind-and-mood/six-relaxation-techniques-to-reduce-stress>
- <https://journals.sagepub.com/doi/full/10.1177/09727531221109117>
- <https://positivepsychology.com/mindfulness-exercises-techniques-activities/>
- <https://www.ncbi.nlm.nih.gov/books/NBK578064/>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recognize the factors that trigger stress and how to manage them.	K1
CO-2	Understand the basic principles of stress management.	K2
CO-3	Develop proactive responses to stressful situations.	K3
CO-4	Distinguish the various principles of relaxation techniques.	K4
CO-5	Examine the defence mechanisms activated during relaxation.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	1	0	0
CO2	3	2	2	1	1	0
CO3	3	3	3	2	2	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

High Correlation : 53% Medium Correlation : 27% Low Correlation: 10% No Correlation : 10%

PSYCHOLOGY OF MIDDLE AGE AND OLD AGE

UPSM401

Semester : IV
Category : Major Core VII
Class & Major : II B.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Recognize Changes in Cognitive Functioning Due to Life Transitions.
CO-2	Understand the Characteristics of Middle Age.
CO-3	Explore Psychosocial Development During Midlife.
CO-4	Devise Strategies for Enhancing Well-being in Old Age.
CO-5	Analyse the Impact of Change on Cognitive Development.

UNIT I – PHYSICAL & COGNITIVE DEVELOPMENT OF MIDDLE AGE 13 Hours

Characteristics of middle age - Developmental tasks - Physical changes, sensory, psychomotor functioning - Sexuality Functioning – Menopause - Health concerns - Measuring cognitive abilities - Creativity and Intelligence - Creativity and Age - Health concerns.

UNIT II – DEALING WITH CHANGE IN MIDDLE AGE 13 Hours

Work and cognitive development - Early Retirement - Changes to interest - Adjustment to changed family patterns - Marital hazards of middle age - Adjustment to single-hood - Adjustment to loss of a spouse - Kübler-Ross Model – Widowhood - Models of coping - Consensual relationship.

UNIT III – PSYCHOSOCIAL DEVELOPMENT IN MIDDLE AGE 13 Hours

Midlife crisis - Identity Development - Psychological Well-being - Theories of social contact - Marriage - Midlife Divorce – Friendship - Empty Nest - Prolonged Parenting - Relationships with aging parents - Relationship with sibling – Grandparenthood - Caregiver Burnout.

UNIT IV – PHYSICAL AND PSYCHOSOCIAL DEVELOPMENT IN OLD AGE 13 Hours

Characteristics of old age - Developmental tasks - Physical development - Sensory and psychomotor functioning - Intellectual development - Health in old age - Social adjustment in old age - Physical hazards - Psychological hazards - Religion and emotional wellbeing - Mistreatment of the elderly - Suicide and Aid in Dying.

UNIT V –DEALING WITH DEATH AND BREAVEMENT**13 Hours**

Social issues related to aging - Relationship with siblings, friends – Grand Children Support - Family management of elder care - Adjustment to retirement - Vocational and Family hazards of old age - Living arrangements for the elderly; Death: facing death; three aspects of death.

Text Books

- Santrock, J. W. (2020). Life span development (18ed), New York, NY: McGraw Hill.
- Papalia, D.E., & Olds, S.W. (2017). Human development(9ed), New York, NY: Tata McGraw Hill.

Reference Books

- Smith, Barry D. (1998). Psychology Science and Understanding. The McGraw-Hill Company.
- Hurlock, E. (2017). Developmental psychology (5th Edition).New Delhi, India: Tata McGraw Hill Publishing Co.
- Feldman R.S. (2015) Development across the lifespan (7 th Ed.) Delhi: Pearson.
- Shaffer D.R. & Kipp K. (2007) Developmental Psychology – Childhood and Adolescence (7 th Ed.) Haryana: Thomson Wadsworth.

e-Resources

- https://www.who.int/health-topics/adolescent-health#tab=tab_1
- <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/adolescent-behavior>
- <https://open.maricopa.edu/devpsych/chapter/chapter-9-early-adulthood/>
- <https://www.scribd.com/document/583341684/Vocational-adjustments-during-early-adulthood>
- https://www.researchgate.net/publication/288174501_Cognition_and_Personality

COURSE OUTCOME

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Describe the physical changes that occur during adolescence and early adulthood.	K1
CO-2	Understand the developmental tasks associated with adolescence and early adulthood.	K2
CO-3	Apply knowledge of family dynamics during adolescence.	K3
CO-4	Analyse the cognitive development theories.	K4
CO-5	Dissect the multifaceted challenges and hazards linked to life transitions.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	1	1	0
CO2	3	2	2	2	1	1
CO3	3	2	3	2	2	2
CO4	3	3	3	2	2	2
CO5	3	3	3	3	3	2

High Correlation: 40% Medium Correlation : 44% Low Correlation : 13% No Correlation : 3%

SOCIAL PSYCHOLOGY II

UPSM402

Semester : IV
Category : Major Core VIII
Class & Major : II B.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand how of social influence enable compliance, conformity and obedience
CO-2	Differentiate between compliance and symbolic social influence.
CO-3	Identify the benefits and drawbacks of joining a group.
CO-4	Analyse Milgram's experiment on obedience.
CO-5	Investigate the relationship between empathy and personality in prosocial actions.

UNIT I – SOCIAL INFLUENCE

13 Hours

Conformity – Meaning - Asch’s research on conformity - Factors affecting conformity - Resisting pressures to conform - Compliance – Meaning - Six basic principles of compliance - Symbolic social influence - Obedience – Meaning - Milgram’s experiment on obedience.

UNIT II – PROSOCIAL BEHAVIOUR

13 Hours

Motives for pro-social behaviour - Competitive altruism - Five crucial steps to determine helping Vs not helping - External and Internal influences on helping behaviour – Empathy - Personality and Helping.

UNIT III – AGGRESSION

13 Hours

Perspectives on aggression – Evolutionary perspective - Drive theories; Modern theories of aggression - Social learning perspective and General Aggression Model; Causes and factors of human aggression – social, cultural, personal and situational - Prevention and control of aggression.

UNIT IV – GROUPS AND INDIVIDUAL

13 Hours

Groups – Mob – Crowd – Meaning – Types - Key components - Stages of group formation - Benefits of joining a group - Social facilitation - Social loafing – Hooliganism - Deindividuation; Conflict: Nature - Causes and Effects - Techniques to resolve conflicts - Perceived fairness in groups - Basic rules for judging fairness - Decision making by groups, Downside to group decision making.

UNIT V – APPLICATION OF SOCIAL PSYCHOLOGY

13 Hours

Social Psychology and legal system - Social Psychology and Health – Health Hazards – Pandemic Situation - Social Psychology and the world of work.

Text Books

- Myers, D.G. & Twenge, J.M. (2017): Social psychology. New York, NY: McGraw – Hill Education.
- Branscombe, N.R., Baron, R.A. & Kapur, P. (2017). Social psychology. Chennai, India: Pearson India Education Services Pvt. Limited.

Reference Books

- Winnicott, D.W. (1995). Counselling and Therapy. London: Sage Publications
- Whiston, S.C (1999). Principles and applications of assessment in counseling , Wadsworth, Belmont. Brooks- Clole
- Myers, D.G. (2002). Social psychology. New York, NY: McGraw Hill Book Company.
- Baron, A., & Byrne, D. (2002). Social psychology. New Delhi, India: Prentice-Hall of India.
- Baron, A., Branscombe, N., Byrne, D., & Bhardwaj, G. (2009). Social psychology. New Delhi, India: Dorling Kindersley (India) Private Limited.

e-Resources

- <https://www.socialpsychology.org/>
- <https://spsp.org/news-center/character-context-blog/new-insights-how-promote-prosocial-behavior>
- <https://opentextbc.ca/socialpsychology/chapter/defining-aggression/>

- <https://opentextbc.ca/socialpsychology/chapter/understanding-social-groups/>
- <https://www.socialpsychology.org/teaching.htm>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Relate the nature and causes of social influence.	K1
CO-2	Observe the internal and external influences on helping behaviour.	K2
CO-3	Employ the strategies that can be used to prevent or control human aggression.	K3
CO-4	Analyse the role of social psychology in various settings like legal system, health and work.	K4
CO-5	Point out the benefits and drawbacks of group decision-making.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	1	0
CO2	3	2	2	2	1	1
CO3	3	3	3	2	1	1
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	2

High Correlation : 50% **Medium Correlation** : 30% **Low Correlation** : 17% **No Correlation** : 3%

INTRODUCTION TO RESEARCH METHODOLOGY

UPSO401

Semester : IV
Category : Major Elective IV
Class & Major : II B.Sc. Psychology

Credit : 3
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Demonstrate the Foundations of Research
CO-2	Illustrate with Importance of the Research Problem and Types of Samplings.
CO-3	Summarize the Basic Concepts and Types of Research Design.
CO-4	Explain the Methods and Types of Data Collection.
CO-5	Construct the use of APA style in Writing Research Reports.

UNIT I - INTRODUCTION

10 Hours

Understanding behaviour - empirical and non-empirical method - overview of research process/framework - Ethics in research - APA ethics code - Plagiarism - Data collection - Observational method - Interview method - Structured, semi structured and focus group interviews - Questionnaire method - Case study method - Its merits and limitations.

UNIT II – VARIABLES, RELIABILITY AND VALIDITY

10 Hours

Types of variables - Reliability and Validity of measurements - Types of validity test - Criterion related validity - Face validity - Content validity - Convergent validity - Types of reliability tests – inter-rater reliability - test-retest reliability - Split half reliability.

UNIT III - HYPOTHESIS AND SAMPLING

10 Hours

Hypothesis - Definition, types - Hypothesis testing - Type 1 and Type II errors - Significance level (p value) - one tailed and two tailed tests - Effect size Sampling - meaning, probability and non-probability Sampling techniques - its merits and limitations.

UNIT IV - RESEARCH DESIGN

10 Hours

Experimental designs - Independent groups designs - Completely randomized groups design - Randomized factorial groups design - Non-Experimental designs - Quasi experimental design - Time series design - Case studies - Correlational research design - Cross sectional research - Longitudinal research.

UNIT V – REPORT WRITING AND COMPUTES IN RESEARCH

12 Hours

Reporting and replication - Experimental reports - Reporting non experimental studies and qualitative studies - Oral and poster presentation - APA primer - Presenting research and preparation of research proposal - Computers in research - Software for quantitative and qualitative data analysis – NVIVO Software.

Text Books

- Jones, S and Forshaw, M. (2014). Research Methods in Psychology. New Delhi: Pearson.
- C.R. Kothari (2004) Research Methodology: Methods & Techniques. New Delhi: New Age International Pvt Ltd

Reference Books

- Gaur A s and Gaur SS (2009). Statistical methods for practice and research. A guide to data Zechmeister S Anne, Zechmeister B Eugene & Shaughnessy J John (2001) Essentials of Research Methods in Psychology. Singapore: McGraw-Hill International Edition.
- Evans, A N and Rooney, B. J. (2008). Methods in Psychological Research. New Delhi: Sage Publications India Pvt Ltd.
- Mc Burney, D. H. and White, T L (2007). Research Methods. USA: Thomson Wadsworth

e-Resources

- https://edutechwiki.unige.ch/en/Research_methodology_resources
- <https://study.sagepub.com/schumacker/student-resources/hypothesis-testing>
- <https://link.springer.com/article/10.1007/s12126-002-1004-2>
- <https://www.questionpro.com/blog/research-design/>
- <https://www.egyankosh.ac.in/bitstream/123456789/39238/1/Unit-5.pdf>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Recognize the various data collection methods to conduct research.	K2
CO-2	Demonstrate the ability to identify the variables and to establish reliability and validity.	K2
CO-3	Formulate hypothesis and research objectives.	K3
CO-4	Determine appropriate research design.	K4
CO-5	Compare various types of validity and reliability measures in research.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	0	0
CO2	3	2	2	2	1	1
CO3	3	3	3	2	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	3	2

High Correlation : 46% **Medium Correlation** : 40% **Low Correlation** : 7% **No Correlation** : 7%

PERSONALITY DEVELOPMENT

UPSD402

Semester : IV
Category : Skill Enhancement Course
Class & Major : II B.Sc. Psychology

Credit : 2
Hours / Week : 2
Total Hours : 26

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Enhance holistic development and improve their personality.
CO-2	Understand themselves and be an effective goal-oriented team player.
CO-3	Develop professionals with idealistic, practical and moral values.
CO-4	Explain perceptions, attitudes, and behaviours when considering themselves and others as part of social groups.
CO-5	Identify acceptable norms of enhancing their personality through the physical aspect.

UNIT- I INTRODUCTION TO PERSONALITY DEVELOPMENT

5 Hours

The Concept Personality- Dimensions of Theories of Freud & Erickson- personality – Significant of Personality Development.

UNIT- II ATTITUDE AND MOTIVATION

5 Hours

Attitude - Concept - Factors affecting attitudes - Positive attitude - Advantages –Negative attitude - Disadvantages - Ways to Develop Positive Attitude - Concept of Motivation - Internal and External Motives - Motivation- Factors leading to De-motivation.

UNIT- III SELF-ESTEEM

5 Hours

Term self-esteem – Advantages - Low self-esteem – Positive and negative Self-Esteem. Interpersonal Relationships – Defining the difference between Aggressive, Submissive and Assertive Behaviours - Lateral thinking.

UNIT- IV OTHER ASPECTS OF PERSONALITY DEVELOPMENT

6 Hours

Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader - Character-building -Team-work - Time management - Work ethics – Good manners and etiquette.

UNIT-V EMPLOYABILITY QUOTIENT

5 Hours

Resume building- The art of participating in Group Discussion – Acing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

Text Books

- Gajendra Singh Chauhan and Sangeeta Sharma, (2015), Soft Skills: An Integrated Approach to Maximize Personality, Kindle Edition
- B.N. Ghosh, (2013) Managing Soft Skills for Personality Development, Tata McGraw Hill Education Private Limited,

Reference Books

- Shikha Kapoor, (2018) Personality Development and Soft Skills: Preparing for Tomorrow, I. K International Publishing House Pvt. Ltd.,
- Elizabeth B.Hurlock(2017), Personality Development, McGraw Hill Education, Indian Edition,
- Boring, E.G., Long Field, H.S., & Weld, H.P. (1963). Foundations of Psychology, New Delhi: Asia Publishing House.
- Hurlock, E. (1974). Personality development. New York: Mc Graw Hill Inc.

e-Resource

- <https://www.verywellmind.com/personality-development-2795425>
- <https://www.indeed.com/career-advice/career-development /attitude-motivation>
- <https://www.verywellmind.com/what-is-self-esteem-2795868>
- <https://examplanning.com/5-aspects-personality-development/>
- <https://eq4c.com/what-is-employability-quotient/>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Memorize the key concepts related to personality development.	K1
CO-2	Comprehend the importance of personality development and interpersonal relationships.	K2
CO-3	Utilize the principles of positive attitude development, motivation factors, and problem-solving techniques in practical scenarios.	K2
CO-4	Analyse the advanced employability skills, including crafting a compelling resume and actively participating in a group discussion.	K4
CO-5	Scrutinize the impact of low self-esteem on personal development.	K4

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	1	1
CO2	3	2	2	2	1	1
CO3	3	3	3	2	2	2
CO4	3	3	3	3	2	2
CO5	3	3	3	3	3	3

High Correlation : 50% **Medium Correlation** : 37% **Low Correlation** : 13% **No Correlation** : 0%

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Course Code	Course Title	Component III	Component IV
III	UPSM301	Psychology of Adolescence and Early Adulthood	Seminar	Chart Work
III	UPSM302	Social Psychology I	Seminar	Case Study
III	UPSO301	Statistics for Behavioural Science	Group Study	Chart Work
III	UPSU301	Managing Behaviour in Organization	Assignment	Chart Work
III	UPSD302	Relaxation Technique	Assignment	Seminar
IV	UPSM401	Psychology of Middle Age and Old Age	Seminar	Group Study
IV	UPSM402	Social Psychology II	Seminar	Problem Solving
IV	UPSO401	Introduction to Research Methodology	Assignment	Chart Work
IV	UPSD402	Personality Development	Assignment	Seminar

M.Sc. PSYCHOLOGY

PREAMBLE

PG: Programme Profile and the Syllabi of Courses Offered in the I & II Semesters along with Evaluation Components III & IV (With effect from 2023 - 2025 Batch Onwards).

PROGRAMME SPECIFIC OUTCOMES

PSO No.	Upon completion of these courses the student would be able to
PSO-1	Relate and draw relationships between significant empirical findings from both classic and contemporary research studies, indicating a holistic understanding of the interconnectedness of different psychological domains.
PSO-2	Demonstrate comprehension of fundamental theoretical principles and practical applications in diverse domains within Psychology.
PSO-3	Apply critical thinking skills to address current societal needs in mental health.
PSO-4	Examine theoretical knowledge related to different disorders and scrutinize the practical application of psychotherapeutic management.
PSO-5	Evaluate the psycho-social development of oneself concerning personal, academic, and professional growth, making informed judgments and assessments.
PSO-6	Create innovative interventions and research methodologies that demonstrate advanced proficiency in applying psychological theories and techniques across diverse domains, showcasing high creativity and originality in addressing complex psychological issues.

PROGRAMME PROFILE M.Sc. Psychology

Semester	Part	Category	Course code	Course Title	Contact Hrs/week	Credit Min/Max
I	I	Major Core I / DSC I	PPSM 101	Advanced General Psychology	5	4
		Major Core II / DSC II	PPSM 102	Applied Social Psychology	5	4
		Major Core III / DSC III	PPSM 103	Lifespan Psychology	5	4
		Elective I (DSE)	PPSO 101	Bio-Psychology	5	3
		Elective II (DSE)	PPSO 102	Community Psychology	5	3
	II	Skill Enhancement Course (NME)			3	2
		Online Course	PONL201	NPTEL	2	2
TOTAL					30	22

II	I	Major Core VI / DSC VI	PPSM201	Theories of Personality	5	4
		Major Core VII / DSC VII	PPSM202	Psychological Statistics.	5	4
		Major Core VIII / DSC VIII	PPSR201	Experimental Psychology Practical -I	5	4
		Core Industry Module	PPSM204	Career Guidance and Counselling	4	3
		Elective III (DSE)	PPSO201	Counselling Skills	4	3
		Elective IV (DSE)	PPSO202	Positive Psychology	4	3
	II	Skill Enhancement Course –Discipline specific	PPSD201	Psychology of Social Problems	3	2
		Internship/Industrial training/ field visit	PINS201			2
		Service Learning			-	1
TOTAL					30	26
III	I	Major Core XI / DSC XI	PPSM301	Psychopathology	5	4
		Major Core XII / DSC XII	PPSM302	Criminal Psychology	5	4
		Major Core XIII / DSC XIII	PPSM303	Research Methodology	5	4
		Core Industry Module	PPSM304	Industrial Psychology	4	3
		Elective V (DSE)	PPSO301	Psychotherapy	4	3
		Elective VI (DSE)	PPSO302	Psychology in Classroom	3	3
	PPSO303		Health Psychology			
	II	SEC (Interdisciplinary)	PPSI301	Nutritional Psychology	4	2
TOTAL					30	23
IV	I	Major Core XVII / DSC XVII	PPSM 401	Clinical Training	15	11
		Major Core XVIII / DSC XVIII	PPSR401	Experimental Psychology Practical -II	5	4
		Project with Viva Voce	PPSP401	Project	6	4
	II	SEC (Professional Competency)	PPSC401	Psychological Testing and Its Application	4	2
		Internship	PINS401			-/2
TOTAL					30	21/23
GRAND TOTAL					120	92/94

PSYCHOPATHOLOGY

PPSM301

Semester : III
Category : Major Core XI
Class & Major : II M.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Develop a comprehensive understanding of ancient and modern conceptions of mental abnormality
CO-2	Apply knowledge of dissociative disorders, somatic symptom disorders, sexual dysfunctions, and paraphilic disorders to case studies
CO-3	Differentiate various psychotic disorders, including Schizophrenia Spectrum and Bipolar Disorders
CO-4	Evaluate the clinical manifestations and treatment options for a range of anxiety disorders, obsessive-compulsive disorders, and trauma-related disorders
CO-5	Synthesize information on impulse control and conduct disorders, substance-related and addictive disorders, and personality disorders

UNIT- I ANCIENT PERSPECTIVES AND CLASSIFICATIONS

15 Hours

Ancient and modern conceptions of mental abnormality - Classification and assessment of mental abnormality - DSM -V and ICD -11 - Methods of clinical assessment – Interviews - Case studies - Psychological tests and behavioral observation - Case history and Mental Status Examination

UNIT- II DEVELOPMENTAL DISORDER

11 Hours

Autism Spectrum Disorder – ADHD – Learning Disability – Intellectual Disability – Tic Disorder

UNIT- III ANXIETY DISORDERS & DISSOCIATIVE DISORDERS

14 Hours

Anxiety Disorders - Obsessive-Compulsive and Related Disorders - Trauma and Stressor – Related Disorder - Dissociative Disorders - Somatic Symptom and Related Disorders - Sexual Dysfunctions - Paraphilic Disorders

UNIT-IV SCHIZOPHRENIA & MOOD DISORDER

11 Hours

Schizophrenia Spectrum and Other Psychotic Disorders - Bipolar and Related Disorders - Depressive Disorders

UNIT- V IMPULSE - CONTROL AND CONDUCT DISORDERS

14 Hours

Disruptive - Impulse - Control and Conduct Disorders - Substance-Related and Addictive Disorders, Personality Disorders - Childhood Disorders: Learning Disability; ADHD

Text Books

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Butcher J.N; Mineka Susan; and Hooley Jill M. (2018). Abnormal Psychology (17th Ed.) Dorling Kindersley (India) Pvt.Ltd. of Pearson Education

Reference books

- World Health Organization (1992). The ICD-10 Classification of mental and behavioural disorders: Clinical description and diagnostic guidelines: Delhi: Oxford University Press.
- Comer, R.J., & Comer, J. S. (2017). Abnormal Psychology. (8th Edition) New York: Worth.

e-Resource

- <https://www.verywellmind.com/an-overview-of-psychopathology-4178942>
- <https://www.mayoclinic.org/diseases-conditions/schizophrenia/symptoms-causes/syc-20354443>
- <https://www.psychologytoday.com/us/basics/sex/sexual-disorders>
- <https://my.clevelandclinic.org/health/diseases/9536-anxiety-disorders>
- <https://www.verywellhealth.com/impulse-control-disorders-5272073>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Compare and contrast between various psychological disorders.	K1, K2
CO-2	Select appropriate therapeutic techniques.	K3
CO-3	Analyze the multiple factors responsible for a particular disorder.	K4
CO-4	Assess the individual's prognosis after therapy sessions.	K5
CO-5	Construct an effective psychotherapeutic program for patients.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	1	3	3	0
CO2	3	3	2	3	3	1
CO3	3	3	3	3	3	0
CO4	2	3	2	3	3	1
CO5	2	3	3	3	3	1

High Correlation : 67% Medium Correlation : 13% Low Correlation : 13% No Correlation : 4%

CRIMINAL PSYCHOLOGY

PPSM302

Semester : III
Category : Major Core XII
Class & Major : II M.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Demonstrate comprehension of the various forms and classifications of criminal behavior.
CO-2	Analyze the association between major mental disorders and criminal behavior, evaluating the complexities and nuances of this relationship.
CO-3	Assess the effectiveness of developmental and situational crime prevention strategies
CO-4	Understand the drug classification and its effects to propose strategies for preventing drug-related crimes.
CO-5	Examine the strengths, limitations, and implications for reducing recidivism.

UNIT- I UNDERSTANDING CRIMINAL BEHAVIOUR

15 Hours

What is crime – Criminal Psychology – Evolutionary Approaches – Developmental Approaches – Psychological Approaches – Biological Approaches – Situational Approaches.

UNIT- II MENTAL DISORDER AND CRIME

11 Hours

Major Mental Disorder – The association between mental disorder and crime – Psychopathy.

UNIT- III DRUGS AND CRIME

11 Hours

Drug Classification and effects of drugs – Drug use and misuse – Understanding the relationship between drugs and crime.

UNIT-IV CRIME PREVENTION

14 Hours

What is crime prevention – Developmental Crime Prevention – Situational Crime Prevention – Strategies for reducing crime.

UNIT- V REHABILITATION AND REINTEGRATION

14 Hours

Risk assessment and re-offending – The nature of rehabilitation – Approaches to rehabilitation – The effectiveness of offender rehabilitation – Models of offender rehabilitation.

Text Books

- Russil Durrant. (2018). An Introduction to Criminal Psychology (2nd Edition). Routledge, New York.

Reference books

- Green Edward J. (1976). Psychology for law enforcement, John Wiley and Sons. Inc
- Kaur, Rajpal (2006). Forensic Psychology, Deep and Deep Publications Pvt. Ltd.
- Kaul, Satyendra K. and Zaidi, Mohd.H. (2008). Narco Analysis, Brain Mapping,

e-Resource

- <https://www.verywellmind.com/criminal-psychologist-a-career-profile-2795649>
- <https://www.apa.org/monitor/2021/04/ce-mental-illness>
- <https://nij.ojp.gov/topics/articles/studying-relationship-between-drugs-and-crime>
- <https://www.ojp.gov/pdffiles/171676.pdf>
- <https://www.un.org/counterterrorism/cct/prosecution-rehabilitation-reintegration>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Infer the association between mental disorders and crime.	K1,K2
CO-2	Choose the appropriate crime prevention in different social settings	K3
CO-3	Analyze the underlying reasons for criminal activities.	K4
CO-4	Assess the psychological and biological explanations for criminal behavior.	K5
CO-5	Formulate effective violence intervention strategies	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	3	1	3	2	1
CO2	1	3	3	3	2	2
CO3	2	3	3	3	2	2
CO4	3	3	2	3	3	2
CO5	3	3	3	3	2	3

High Correlation : 57% Medium Correlation : 33% Low Correlation : 10% No Correlation : 0%

RESEARCH METHODOLOGY

PPSM303

Semester : III
Category : Major Core XIII
Class & Major : II M.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Identify the characteristics, strengths, and weaknesses of both qualitative and quantitative research methods.
CO-2	Explain the importance of good research problems and hypotheses, applying criteria for their evaluation.
CO-3	Demonstrate an understanding of different types of variables and articulate constitutive and operational definitions.
CO-4	Analyze the process of data collection by comparing and contrasting quantitative tools and qualitative methods
CO-5	Evaluate the appropriateness of specific research designs for different research questions or scenarios.

UNIT- I PURPOSE AND TYPES OF RESEARCH

15 Hours

Basic research - Applied research - Action research - Quantitative and qualitative research - difference between qualitative and quantitative research and their strengths and weaknesses.

UNIT- II PROBLEMS AND HYPOTHESES

11 Hours

Problems, hypotheses constructs, variables and definitions: Definition of problems and hypotheses; The importance and criteria of good research problems and hypotheses; definition and types of variables; constitutive and operational definitions of variables.

UNIT- III SAMPLING AND RESEARCH DESIGNS

11 Hours

Sampling: Definition; sample size and representativeness; kinds of sampling- probability and non- probability.

Research Designs: Meaning, purpose and principles; Experimental design, nonexperimental design, ex-post-fact design; other specialized designs like pre-post-test design, the cross-sectional design, single subject study design, the longitudinal study design, survey research, correlational design, observational design and ethnography design.

UNIT-IV PROCESS OF DATA COLLECTION

14 Hours

Quantitative (structured questionnaire, semi-structured questionnaire and standardized test) and qualitative (informal interview, case study, in-depth interview, focus group discussion, observation, participatory rural appraisal, projective tests) - Development and standardization of tool.

UNIT- V ETHICS IN RESEARCH

14 Hours

Ethics in research and its importance especially need for informed consent, confidentiality of information, compensation and deciding date and time for data collection as per convenience of the study subjects and giving feedback about the findings. Reference writing styles; Monitoring and evaluation: Utility of monitoring and evaluation of programs; preparing a research proposal and writing research report and article; plagiarism

Text Books

- Kothari, C.R. & Gaurav C. (2019). Research Methodology.(4th Edition) New Age International
- Best, J.W. and Kahn, J.V. (2014). Research in education (10th Edition) New Delhi: Pearson Education.

Reference books

- Kenneth, B.S.& Bruce, A.B. (2013). Research Design and Methods. (9th Edition) New Delhi: Tata McGraw Hill Publishing Company Ltd.
- Russell, B.H. (1988). Research Methods in Cultural Anthropology. New Delhi: Sage Publications
- Kerlinger, F.N. (2017). Foundations of Behavioural Research. Delhi: Surjeet Publications.

e-Resource

- <https://www.discoverphds.com/blog/types-of-research>
- <https://www.tandfonline.com/doi/full/10.1080/00313831.2021.1982765>
- <https://dissertation.laerd.com/how-to-structure-quantitative-research-questions.php>
- <https://www.scribbr.com/methodology/data-collection/>
- <https://www.scribbr.com/methodology/research-ethics/>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Identify the fundamental principles and procedures of psychological research	K1, K2
CO-2	Apply the principles of the scientific method to conduct experimental research	K3
CO-3	Analyze the importance of ethics in research.	K4
CO-4	Evaluate the strengths and limitations of various research designs.	K5
CO-5	Develop effective research design to address current world problems.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	0	1	2	3	3
CO2	1	1	0	2	3	3
CO3	2	1	0	3	3	3
CO4	2	1	1	2	3	3
CO5	3	1	2	2	3	3

High Correlation: 43% Medium Correlation : 24% Low Correlation: 23% No Correlation: 10%

INDUSTRIAL PSYCHOLOGY

PPSM304

Semester : III
 Category : Core Industry Module
 Class & Major : II M.Sc. Psychology

Credit : 3
 Hours / Week : 4
 Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Define the historical development of industrial psychology as an academic discipline.
CO-2	Explain the role of motivation in job satisfaction and its impact on employee performance.
CO-3	Propose effective strategies for improving job satisfaction and employee well-being based on the principles of industrial psychology.
CO-4	Evaluate the effectiveness and potential errors in performance appraisal methods.
CO-5	Create a comprehensive plan for improving the quality of work life, considering stress reduction and overall employee satisfaction.

UNIT- I AN OVERVIEW OF INDUSTRIAL PSYCHOLOGY

10 Hours

Historical Aspect – Hawthorn Experiment - The development of industrial psychology - Industrial psychology as an academic discipline - Industrial psychology as a career - Industrial psychology in the future.

UNIT- II MOTIVATION

10 Hours

Motivation and job Satisfaction - Employee motivation and job satisfaction -Role of work motivation in performance - Dispositional theories of work motivation - Cognitive theories of work motivation - The applied implications of motivation theories - Job Involvement – Job satisfaction.

UNIT- III WORKING CONDITIONS**10 Hours**

Employee Absenteeism, Turnover, and Organizational Commitment Job design and working conditions - The human factors approach to job design - The psychological approach to job design - Working conditions.

UNIT-IV EMPLOYEE WELFARE**11 Hours**

Employee health, safety, and well-being - Safety at work - Health at work - Stress at work - The quality of work life and employee well-being - Concluding remarks on employee health and safety.

UNIT- V PERFORMANCE EVALUATION**11 Hours**

Work performance and its measurement - The determinants of work performance - The appraisal of work performance - Error in evaluating work performance - Improving performance appraisal - The performance appraisal interview - Job analysis and evaluation.

Text Books

- Jewell, L.N. (1998) Contemporary Industrial / Organizational Psychology. (3rd Ed.) California: Brooks / Cole Publishing Company
- McCormick, E.J. Ilgen, O.R. (1984) Industrial Psychology. (7th Ed.) New Delhi: Prentice Hall of India Private limited.

Reference books

- Muchinsky, P.M. (2000) Psychology Applied to Work, (6th Ed.) Belmont: Wadsworth Thomson Learning
- Blum, M.L., Naylor, J.C. (1984) Industrial Psychology Theoretical and Social Foundations. Delhi: CBS Publishers and Distributors

e-Resource

- <https://positivepsychology.com/industrial-psychology/>
- <https://www.verywellmind.com/what-is-motivation-2795378>
- <https://simplicable.com/new/working-conditions>
- <https://www.pelagohealth.com/resources/hr-glossary/employee-welfare/>
- <https://www.forbes.com/advisor/business/performance-review/>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Summarize the psychological principles related to employee overall welfare.	K1,K2
CO-2	Apply motivational theories to enhance job satisfaction and performance.	K3
CO-3	Prioritize ethical and lawful decision making about people at work	K4
CO-4	Evaluate the impact of various factors for organizational commitment.	K5
CO-5	Create a better work environment for better performance.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	0	3	1	3	1
CO2	3	0	3	3	3	2
CO3	3	1	3	0	3	2
CO4	3	1	3	2	3	3
CO5	3	2	3	3	2	3

High Correlation: 60% Medium Correlation:17% Low Correlation:23% No Correlation: 0%

PSYCHOTHERAPY

PPSO301

Semester : III
 Category : Elective V
 Class & Major : II M.Sc. Psychology

Credit : 3
 Hours / Week : 4
 Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Define the fundamental concepts of psychotherapy.
CO-2	Analyze the goals and ethical considerations in psychotherapy practices.
CO-3	Evaluate and compare various psychotherapeutic approaches.
CO-4	Apply cognitive-behavioral therapeutic techniques in hypothetical scenarios.
CO-5	Design and justify a group therapy intervention plan.

UNIT- I INTRODUCTION

10 Hours

Definitions of psychotherapy - Goals of psychotherapy - Professional issues, training - Ethical issues; personal characteristics of therapists - Common and unique features of psychotherapies.

UNIT- II PSYCHOTHERAPY

10 Hours

Psychodynamic Therapy; Humanistic Therapy (Client Centered Therapy) - Gestalt Therapy.

UNIT- III COGNITIVE BEHAVIOUR THERAPY

10 Hours

Albert Ellis Therapy - Aaron Beck's Cognitive Therapy - Third Wave Therapies; DBT; MBTSR.

UNIT-IV BEHAVIOUR THERAPIES

11 Hours

Therapeutic techniques based on classical - Operant and modeling theories - Modeling – live modelling - Participant modeling (behaviour rehearsal) symbolic modeling and covert modelling -

Relaxation training - Muscular relaxation – Meditation – Flooding - Systematic Desensitization - Paradoxical Intention - Assertive training.

UNIT- V GROUP THERAPY

11 Hours

Group Therapy – Difference between Group Therapy and Group Activity - Family/Marital Therapy - Transactional Analysis.

Text Books

- Bellack, A.S., Herson, M & Kazdin, A.E. (2012). International Handbook of Behaviour Modification And Therapy; Springer.
- Bergin, A.E. & Garfield, S.L. (1994). Handbook of Psychotherapy and Behavioural Change. 4th ed. N.Y. Wiley.

Reference books

- Colemom J.C. Butcher J.N. and Carson B.C. (1984) Abnormal Psychology and Modern Life, 7 th edition. Scot, Foresman and Company.
- Gabbarel, G.O., Beck, J.S., & Holmes, J. (2007). Oxford Text Book of Psychotherapy. New York: Oxford University Press.
- Norcros, J. C., & GoldFried, M. R., (2005). Handbook of Psychotherapy Integration New York: Oxford Press.

e-Resource

- <https://www.verywellmind.com/psychotherapy-4157172>
- <https://www.psychologytoday.com/us/therapy-types/humanistic-therapy>
- <https://albertellis.org/rebt-cbt-therapy/>
- <https://www.verywellmind.com/what-is-behavioral-therapy-2795998>
- <https://www.medicalnewstoday.com/articles/group-therapy>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom’s Level
CO-1	Explain the basic principles of various therapeutic approaches	K1, K2
CO-2	Solve the ethical considerations and professional issues.	K3
CO-3	Discover various psychotherapeutic approaches.	K4
CO-4	Asses the client’s problems and decide an appropriate approach.	K5
CO-5	Design an effective therapeutic program for addressing various programs.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	0	2	0
CO2	3	2	2	1	2	2
CO3	3	2	2	1	3	3
CO4	3	3	3	2	3	2
CO5	3	3	3	3	3	3

High Correlation:53% Medium Correlation:33% Low Correlation: 7% No Correlation : 7%

PSYCHOLOGY IN CLASSROOM

PPSO302

Semester : III
Category : Elective VI
Class & Major : II M.Sc. Psychology

Credit : 3
Hours / Week : 3
Total Hours : 39

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the Historical Foundations of School Psychology
CO-2	Analyze the Role and Skills of a School Psychologist
CO-3	Differentiate Between Various Aspects of Human Differences
CO-4	Evaluate Services for Children with Special Needs
CO-5	Design Interventions for Common Problems in School Children

UNIT- I- FOUNDATIONS OF SCHOOL PSYCHOLOGY

8 Hours

Historical background- Definition- Educational Psychology and School Psychology- Nature and Scope of School Psychology- Role of a School Psychologist as a Professional- Skills of School Psychologists- Services of School Psychologists.

UNIT- II- PSYCHOLOGY OF HUMAN DIFFERENCES

8 Hours

Individual differences: Aptitudes and talents- Personality- Intelligence (Giftedness Vs. Intellectually disabled) Cognitive styles- Interests and Values- Varieties of Group differences: Sex- Age- Race- Social class- Factors producing differences

UNIT- III SPECTRUM OF HUMAN EXCEPTIONALITY

8 Hours

Conception of exceptional people-Children with special needs: Physical, Intellectual, Emotional, Family and personal problems of exceptional people- Special services: Day care centres- Rehabilitation centres- self-help groups- Learning difficulties and disabilities- Gifted children

UNIT-IV PROBLEMS OF SCHOOL CHILDREN**7 Hours**

Problems of Children-family, reading, potential for dropout- Anger /compliance problems- Attendance problems- Anxiety-related problems- Study habit deficiencies- Relational aggression and bullying- Grief and loss- Separation and divorce- ADHD – Autism - Other problems.

UNIT- V EMPOWERING LEARNERS**8 Hours**

Intervention for Learning Difficulties – Learning Theories - Aggression and Bullying- Educational practices: Inclusive education- Segregation- Enrichment- Educational policies- Out-of-school programs: Summer Training- Activity centres-.

Text Books

- Wolman, Benjamin B.(Ed.). (1985). Handbook of Intelligence. N.Y: John Wiley
- Cruickshank & Johnson (Eds.) (1975). Education of Exceptional Children and Youth (3rd Ed.). N. J.: Prentice Hall,

Reference books

- Phillips, B.N. (1990). School Psychology at a turning point. San Francisco: Jossey- Bass Publishers.
- Hardman, M.L., Drew, C.J., Egan, M.W., Wolf, B. (1990). Human Exceptionality (3rd Ed.), London: Allyn and Bacon.
- Guilford J.P. (1977) The Way Beyond IQ. Buffalo: Creative Education Foundation

e-Resource

- <https://positivepsychology.com/school-psychology/>
- <https://study.com/academy/lesson/the-history-of-school-psychology.html>
- https://www.researchgate.net/publication/228406232_2_The_History_of_School_Psychology_Understanding_the_Past_to_Not_Repeat_It

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Define school psychology and list out its benefits.	K1,K2
CO-2	Identify and understand psychological problems affecting school children	K3
CO-3	Analyse the potential causes of reading difficulties and dropout risk.	K4
CO-4	Assess the impact of family and personal factors on exceptional individuals.	K5
CO-5	Develop skills to identify and discuss the ethical and legal aspects of situations that arise in school.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	0	2	1	3	0
CO2	3	1	2	2	3	0
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 70% Medium Correlation:13% Low Correlation:7% No Correlation:10%

HEALTH PSYCHOLOGY

PPSO303

Semester : IV
 Category : Major Core XVIII
 Class & Major : II M.Sc. Psychology

Credit : 3
 Hours / Week : 3
 Total Hours : 39

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the concept of health and the various dimensions of health.
CO-2	Associate the role of health models in shaping healthcare practices and policies.
CO-3	Apply psychosocial interventions to enhance the well-being of individuals with chronic conditions.
CO-4	Analyze psychosocial factors influencing the experience and perception of pain.
CO-5	Develop effective communication skills for healthcare professionals.

UNIT I – FOUNDATION OF HEALTH PSYCHOLOGY

8 Hours

Introduction to health psychology - Concept of Health – WHO Definition of health psychology - Health Behaviour - Health Promotion - Factors predicting health behaviour.

UNIT II – MODELS OF HEALTH AND WELLNES

8 Hours

Models of health - biomedical, biopsychosocial, health belief and social cognitive models.

UNIT III – CHRONIC ILLNESS

8 Hours

Chronic illness: Adjusting to a chronic illness - causes, effects, medical regimen and psychosocial factors in asthma, epilepsy - Nervous system injuries – Diabetes – Arthritis - hypertension and Alzheimer’s disease - Coping with and adapting to high mortality illness - Heart disease – Stroke – Cancer - Psychosocial interventions for people with chronic conditions.

UNIT IV – UNDERSTANDING PAIN: MODELS AND MANAGEMENT**7 Hours**

Pain: Types of pain, Specific chronic pain conditions, Models of pain- The Gate Control Theory - Biopsychosocial Model - Cognitive-Behavioral - Fear-Avoidance Model; Psychosocial factors and pain - Assessment of pain - Management of pain.

UNIT V – EFFECTIVE HEALTH COMMUNICATION**8 Hours**

Health communication: Perceiving and interpreting symptoms - Using and misusing health services - Patient - practitioner relationship - Patient-practitioner interaction - Adhering to medical advice - Assessment of Health.

Text Books

- Edward P Sarafino, Timothy W Smith (2012). Health Psychology (7th Ed.), Wiley India.
- Shelley Taylor (2014). Health Psychology. (9th Ed.) Mc Graw- Hill publication

Reference Books

- Bret A. Boyer and M. Indira Paharia (2008). Comprehensive Handbook of Clinical Health Psychology, John Wiley & Sons, Inc.
- Sarafino, E. P. (2015). Health Psychology: Biopsychosocial Interactions (8th Ed.). Wiley.
- Taylor, S. E. (2015). Health Psychology (9th Ed.). McGraw-Hill Education.
- Ogden, J. (2012). Health Psychology: A Textbook (5th Ed.). Open University Press.

e-Resource

- <https://uq.pressbooks.pub/health-information-research-essentials/chapter/intro-health/>
- <https://simplemed.co.uk/subjects/population-and-social-science/models-of-health>
- <https://www.sciencedirect.com/topics/medicine-and-dentistry/health-belief-model>
- <https://www.psychologytoday.com/intl/blog/science-of-choice/202304/7-psychological-factors-affecting-pain-perception>
- <https://www.brainpost.co/weekly-brainpost/2021/5/4/what-factors-impact-our-perception-of-pain>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Summarize the foundations and models of health psychology.	K1, K2
CO-2	Apply evidence-based strategies to manage stress.	K3
CO-3	Analyse the concepts of behaviour and its implications for health promotion.	K4
CO-4	Assess the efficacy of intervention programs improving patient's overall well-being and quality of life.	K5
CO-5	Formulate an intervention plan for individuals dealing with addiction.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	0	2	0	3	1
CO2	3	1	3	1	3	1
CO3	3	2	3	2	3	2
CO4	3	3	3	2	3	2
CO5	3	3	3	2	3	3

High Correlation :57% Medium Correlation : 23% Low Correlation:13% No Correlation : 7%

NUTRITIONAL PSYCHOLOGY

PPSI301

Semester : III
Category : SEC
Class & Major : II M.Sc. Psychology

Credit : 2
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Articulate the historical development and fundamental concepts of nutrition.
CO-2	Comprehend the diverse roles of nutrients in maintaining health
CO-3	Apply nutritional knowledge to address specific requirements during different life stages, such as pregnancy, infancy, childhood, adolescence, and aging.
CO-4	Analyse the impact of malnutrition on brain development
CO-5	Formulate nutrition counselling strategies by integrating knowledge of resources, ethical responsibilities, and practical elements of the helping process.

UNIT- I NUTRITION

10 Hours

Nutrition – History – Concepts – Role of nutrition in maintaining health- Classification of foods – Role of food and its medicinal value – Food versus non-food - Sacred versus profane foods – Food Fadism – Nutrients – CHO, Protein, Fat, Vitamins and minerals – Functions – Classification - Dietary sources - Digestion and absorption

UNIT- II NUTRITION IN DIFFERENT STAGES

10 Hours

Nutrition in pregnancy and lactation:

Nutritional demands of pregnancy – Food selection in pregnancy – Complications of pregnancy – Diet during labor – Diet following delivery – Diet in Lactation.

Nutrition during infancy and early child hood:

Nutritional requirements of infants – Breast feeding – Introduction of solid foods – Feeding difficulties in infants – Other considerations in infant feeding – The toddler.

Nutrition for children, adolescents and adults:

Nutritional requirements – food habits and eating practices

Nutrition for older persons:

Nutrition and aging – Dieting intakes and requirements of older people - Planning meals for older people – Nutritional problems and nutrition programs for older people

UNIT- III NUTRITION ON BRAIN DEVELOPMENT

10 Hours

Normal cellular growth of the brain – Effects of malnutrition – Role of nutrition on brain.

UNIT-IV MALNUTRITION AND EATING DISORDER AND VARIOUS DISEASES 11 Hours

Protein energy - Malnutrition – Vitamin deficiencies - Mineral Deficiencies, obesity, under weight and anorexia nervosa & bulimia - Etiology – Complications – Dietary treatment. Introduction to therapeutic diets - Dietary management for gastro intestinal diseases, diabetes mellitus, renal diseases, cardiac diseases, malignancy, hypertension and HIV.

UNIT- V NUTRITION COUNSELLING

11 Hours

The nutrition counsellor – Resources for the nutrition counsellor – Responsibility of the nutrition counsellor – Determining the role of Nutrition counsellor practitioner – Managed Vs Client managed care requirements of infants - Breast feeding - Formulas - Types and sources – Elements of helping process – Interviewing

Text Books

- Srilakshmi, B (2003). Dietetics (Second Edition) New Age International (p) Ltd.
- Swaminathan, M (1985). Advanced Text –Book on Food & Nutrition Vol-I and Vol-II, The Bangalore printing & publishing Co. Ltd.

Reference books

- Sue Rodwell Williams (2001). Basic Nutrition and Diet Therapy (11th Edition).

e-Resource

- <https://www.bmj.com/content/361/bmj.k2392>
- <https://ncbi.nlm.nih.gov/books/NBK560007/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6045434/>
- <https://my.clevelandclinic.org/health/diseases/22987-malnutrition>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6780101/>

COURSE OUTCOMES

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the concept of health from the individual and community perspective	K1, K2
CO-2	Apply dietary principles to address complications related to pregnancy, lactation, and infancy.	K3
CO-3	Analyse nutritional requirements, and food habits across different age groups for successful aging.	K4
CO-4	Assess dietary management strategies for various diseases and conditions.	K5
CO-5	Develop comprehensive dietary plans for different age groups.	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	0	2	0	3	1
CO2	2	1	3	1	3	1
CO3	2	2	3	2	3	2
CO4	2	3	3	2	3	2
CO5	2	3	3	2	3	3

High Correlation : 43% **Medium Correlation** : 37% **Low Correlation** : 13% **No Correlation** : 7%

EXPERIMENTAL PSYCHOLOGY PRACTICAL – II

PPSR401

Semester : IV
Category : Major Core VIII
Class & Major : II M.Sc. Psychology

Credit : 4
Hours / Week : 5
Total Hours : 65

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Demonstrating a comprehensive understanding of the factors contribute to behavior and decision-making.
CO-2	Explain cognitive processes through practical application of intelligence tests
CO-3	Analyse cognitive processes through practical application of intelligence tests
CO-4	Evaluate leadership and decision-making skills using instruments
CO-5	Apply memory and personality assessment techniques, interpreting results and relating them to broader psychological theories.

UNIT- I LEARNING / INTELLIGENCE

13 Hours

Mirror Drawing Test- Kohs block design test-Seguín Form board

UNIT- II ATTENTION/PERCEPTION

13 Hours

Two Point Threshold- Muller Lyer Illusion- Size weight Illusion

UNIT –II MEMORY /PERSONALITY

13 Hours

PGI memory scale- 16 Personality factor

UNIT-IV LEADERSHIP

13 Hours

Decision Making scale- Leadership Preference scale

UNIT- V MOTIVATION /APTITUDE

13 Hours

Level of aspiration - Test of personal values

Reference books

- Anne Anastasi, Susana Urbina “Psychological Testing” 7th Edition pearson Publication, 2016.
- Rajamani.M. Experimental Psychology with Advanced Experiments, Concept Publishing Company New Delhi, 2005.
- Woodworth.R.S& Schlosberg. H Experimental Biology. NewYorkMethenand Co. Ltd, 1965.

e-Resource

- <https://www.britannica.com/science/experimental-psychology>
- <https://www.verywellmind.com/what-is-experimental-psychology-2795784>

- <https://online.csp.edu/resources/article/what-is-experimental-psychology/>

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Define psychological principles through tests and experiments.	K1, K2
CO-2	Build appropriate instruction manual for the subjects for conducting the test	K3
CO-3	Infer the data obtained and write a report.	K4
CO-4	Evaluate the differences among various intelligence and ability tests.	K5
CO-5	Improve knowledge and skills to prepare and present the report	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	1	3	3	1
CO2	3	2	0	3	3	2
CO3	3	1	0	3	3	3
CO4	3	0	1	3	3	2
CO5	3	3	2	3	3	3

High Correlation : 60% **Medium Correlation** : 13% **Low Correlation** : 17% **No Correlation** : 10%

PSYCHOLOGICAL TESTING AND ITS APPLICATIONS

PPSC401

Semester : IV
Category : SEC
Class & Major : I M.Sc. Psychology

Credit : 2
Hours / Week : 4
Total Hours : 52

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Memorize and recall key concepts of psychological thought in major Eastern systems, including Bhagavad Gita, Buddhism, Sufism, and Integral Yoga.
CO-2	Identify and differentiate between types of psychological tests and their respective applications
CO-3	Compare and contrast different approaches to the study of motivation
CO-4	Examine developmental processes, factors influencing human development, and stages of development
CO-5	Apply knowledge of wellbeing and self-growth concepts to solve practical problems.

UNIT- I EMERGENCE OF PSYCHOLOGY

10 Hours

Psychological thought in some major Eastern Systems: Bhagavad Gita – Buddhism - Sufism and Integral Yoga - Essential aspects of knowledge paradigms: Ontology – epistemology and methodology.

UNIT- II PSYCHOLOGICAL TESTING

10 Hours

Types of tests Test construction - Test standardization: Reliability - Validity and Norms Areas of testing: Intelligence – Creativity - Neuropsychological tests – Aptitude - Personality assessment - Interest inventories Attitude scales – Semantic differential – Staples - Likert scale - Computer-based psychological testing

UNIT- III MOTIVATION

10 Hours

Basic motivational concepts: Instincts, Needs, Drives, Arousal, Incentives, Motivational Cycle. Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic Exploratory behaviour and curiosity Zuckerman's Sensation seeking Achievement, Affiliation and Power Motivational Competence Self-regulation Flow – Hull Theory.

UNIT-IV HUMAN DEVELOPMENT AND INTERVENTIONS**11 Hours**

Developmental processes: Nature & Principles - Factors in development - Stages of Development - Successful aging - Psychopathology: Concept - Mental Status Examination - Classification, Causes.

UNIT- V EMERGING AREAS**11 Hours**

Wellbeing and self-growth: Types of wellbeing [Hedonic and Eudemonic] - Character strengths - Resilience and Post-Traumatic Growth - Peace psychology: Violence - non-violence - conflict resolution at macro level - role of media in conflict resolution.

Text Books

- Morgan, C.T., King, R.A., Weisy, J.R. and Scooper, J. (1993). Introduction to Psychology, New Delhi: Tata Mc-Graw Hill Publishing Company.
- Baron, R.A. (1998) Psychology. Boston: Allyn & Bacon.

Reference books

- Hilgard, E.R. (1999). Introduction to Psychology (6th Ed.), New Delhi: Oxford and IBH Publishing Co, Pvt Ltd.
- Mangal, S.K (1999). General Psychology. New Delhi: Surjeeth Publications.
- Rajamanickam, M. (2000). Modern General Psychology. Agra: Bhargava Book House.

e-Resource

- Frontiers in Psychology (<https://www.frontiersin.org/journals/psychology>)
- Archives of Scientific Psychology (<https://psycnet.apa.org/PsycARTICLES/journal/arc/6/1>)
- BMC PSYCHOLOGY (<https://bmcpublishing.biomedcentral.com/>)
- <https://www.psywww.com/careers/specialt.html>www.worthpublishers.com/hockenbury
- <https://courses.lumenlearning.com/wsu-sandbox/chapter/gestalt-principles-of-perception/>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	List out the tests related to areas of adolescence and health psychology	K1, K2
CO-2	Apply a cross-cultural perspective to the study of psychological assessment	K3
CO-3	Analyse the principles of psychological test construction to the construction of objective test items.	K4
CO-4	Assess the social and ethical issues related to psychological assessment	K5
CO-5	Choose appropriate use of psychological assessments	K6

Course Mapping

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	1	3	3	0
CO2	3	2	2	3	3	1
CO3	3	2	2	3	3	2
CO4	3	2	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation:67% Medium Correlation:20% Low Correlation:10% No Correlation:3%

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Course Code	Course Title	Component III	Component IV
III	PPSM301	Psychopathology	Seminar	Chart Work
III	PPSM302	Criminal Psychology	Seminar	Case Study
III	PPSM303	Research Methodology	Group Study	Chart Work
III	PPSM304	Industrial Psychology	Assignment	Chart Work
III	PPSO301	Psychotherapy	Assignment	Seminar
III	PPSO302	Psychology in Classroom	Seminar	Problem Solving
	PPSO303	Health Psychology		
III	PPSI301	Nutritional Psychology	Seminar	Chart Work
IV	PPSC401	Psychological Testing and It's Applications	Assignment	Seminar

DEPARTMENT OF COSTUME DESIGN & FASHION DESIGN

PREAMBLE

UG: Programmed Profile and the Syllabi of Courses offered in the V and VI Semester along with Evaluation Components III & IV (With Effect From 2022- 2025 Batch Onwards).

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	On completion of this programme, the students will be able to
PSO-1	Global competition is critical and such for a worldwide garment and fashion sector, the main streams of fashion being, stitching, sketching and fabric science.
PSO-2	Design and develop strategies to manage the garment and fashion industries as well as solve real time problems related to Fashion industry.
PSO-3	Improving student's knowledge on fashion using practical labs with textile testing, printings, dyeing build up strong student apparel industry background.
PSO-4	Analyzing textile test results by understanding its theoretical knowledge through performing practical experiments so that the quality of textiles used in various fashion applications can be determined.
PSO-5	Technicalities of fashion photography images in an attractive way which communicates designers mind like fabric drape, grain line, silhouette influence to be able to make intended shapes which result into desired dimensions.
PSO-6	Hands-on experience acquired during fashion styling including wardrobe selection, accessorizing with makeup application. apply Aari work or home textile elements creatively in designing for customers.

PROGRAM PROFILE B.Sc., COSTUME DESIGN & FASHION

Sem ester	Part	Category	Course code	Course Title	Previous Course Code	Contact Hrs/ week	Credit	
							Min/Max	
I	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I / French-I	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4	
	II	Communicative English / AECC – I	UCCEL101/ UCCEL102	Communicative English I/ Effective Communicative English I	-	5	3/4	
	III	Major Core -I \ DSC-I	UCDM101	Fundamentals of Fashion Design	-	5	4	
			Allied - I \ GE - I	UCDA101	Indian Costumes and Textile	-	4	4
			Major Core Practical -I	UCDR101	Fashion Illustration Practical	-	5	3
			Major Core Practical-II	UCDR102	Basic of Apparel Construction practical	-	4	2
			PE	UPEM101	Professional English I	-	6	4
	IV	Value Education (VE)				2	1	
	TOTAL						36	24/26

II	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL207/ UTAL208/ UHIL202/ UFRL202	Basic Tamil II/ Advanced Tamil-II/ Hindi-II / French-II	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4
	II	Communicative English / AECC – I	UCEL201/ UCEL202	Communicative English II / Effective Communicative English II	-	5	3/4
	III	Major Core –II\ DSC- II	UCDM201	Fiber and yarn Manufacturing	-	2	1
		Major Core –III \ DSC- III	UCDM202	Pattern Making	-	2	1
		Major Core Practical -III	UCDR201	Advance Fashion Illustration	-	4	3
		Major Core Practical -IV	UCDR202	Kids Apparel	-	4	3
		Allied - II \ GE - II	UCDA201	Apparel Marketing	-	3	3
		Allied Practical -I PE	UCDR203 UPEM201	Surface Embellishment Professional English II	-	2 6	2 4
	IV	Non Major Elective				3	2
V	Extension Programme/ Physical Education				-	1/2	
TOTAL						36	26/29
III	III	Major Core – IV / DSC - IV	UCDM301	Fabric Manufacturing Techniques	-	3	4
		Major core Practical-V	UCDR301	Fabric Structure and Design	-	4	4
		Major core Practical-VI	UCDR302	Computer Aided Designing-practical-I	-	6	4
		Allied Paper-III	UCDA301	Visual Merchandising	-	3	2
	IV	Major Core - V	UCDM302	Fashion clothing and Psychology	-	3	3
		Major Core Practical - VII	UCDR303	Women’s Apparel	-	6	4
		Online Course NPTEL				3	2
		Value Education (VE)				2	1
TOTAL						30	24/26
IV	III	Major Core Paper-VI	UCDM401	Textile wet processing	-	4	3
	III	Major core Practical- VIII	UCDR401	Textile wet processing Practical		4	3
	II	Allied Paper-IV	UCDR402	Men’s Apparel	-	6	5
	III	Allied – Practical-II	UCDR403	Fashion Accessories	-	4	3
	IV	Major Core Paper-VII	UCDM402	Boutique Management	-	4	3
	IV	Major Core Paper-VIII	UCDM403	Textile Finishing & Fabric Care	-	3	3
		Soft Skill				2	1
		Non Major Elective			-	3	2
V	Extension programme/ Physical Education				-	1/2	
TOTAL						30	24/26

V	III	Major Core Paper-IX	UCDM501	Textile Testing & Statistical Application	-	5	4
	III	Major Core Practical -X	UCDR501	Textile Testing-Practical	-	4	4
	III	Major Core Practical- XI	UCDR502	Computer Aided Designing-practical-II	-	5	4
	III	Major Core Paper -X	UCDM502	Fashion Entrepreneurship	-	5	4
	III	Major Elective -I	UCDR504/ UCDR505	Fashion Styling / Beauty Care-Practical		4	3
	III	Major Core Practical - XII	UCDR503	Fashion Portfolio-Practical	-	5	4
	IV	Value Education (VE)				2	1
TOTAL						30	24/26
VI	III	Major Core -XI	UCDM601	Garment Quality Control	-	5	4
		Major Core-XII	UCDM602	Digital Marketing		4	3
		Major Core - XII(Project)	UCDP601	Project Work	-	8	5
		Major Core Practical- XIII	UCDR602	Fashion Draping-Practical	-	6	4
		Major core Practical- XIV	UCDR603	Fashion Photography-Practical		5	4
		Major Elective-II	UCDR604/ UCDR605	Home Textile/ Fashion Aari work - practical	-	5	3
	III	Internship					-/1
	IV	Comprehensive Viva	UCDM603		-	-	1
		Soft Skill				2	
	V	Extension programme/ Physical Education				-	2
TOTAL						30	26/29
GRAND TOTAL						192	148/160

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/week	Credit Min/Max
II	IV	Non Major Elective	UCDE201	Embroidery	-	3	2
IV	IV	Non Major Elective	UCDE401	Accessories Making	-	3	2
IV	IV	Non Major Elective	UCDE402	General Painting Techniques	-	3	2

TEXTILE TESTING & STATISTICAL APPLICATION

UCDM501

Semester : V

Credit : 4

Category : Major Core Paper-IX

Hours/Week : 5

Class &Major: III B.Sc. Costume Design and Fashion

Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Compare to study Textile Testing & Fiber Testing
CO 2	Summarize fibre physical characteristics
CO 3	Identify yarn properties and fabric properties
CO 4	Discover Apparel & Accessories Testing
CO 5	Determine Statistical Quality Control

Unit I INTRODUCTION TO TEXTILE TESTING

12 Hours

Introduction of textile testing, sampling, random sampling, biased sampling, sampling techniques, square, cut square, zoning technique, selection of sample for testing, grading of cotton fibre with respect to staple length, laboratory measurement of fibre length, span length, Baer sorter, Shirley photo electric staple, servo fibro graph, salient features of HVI.

Unit II MEASUREMENT OF FIBRE PHYSICAL CHARACTERISTICS

11 Hours

Fibre length, fineness, maturity and foreign matter of cotton and other fibres, Principle, construction, operation and calibration of equipment in common use for measurement of above properties. Grading of different cottons

Unit III MEASUREMENT OF YARN PROPERTIES AND FABRIC PROPERTIES

12 Hours

Yarn numbering systems, Conversion methods. Measurement of yarn number. Twist in spun, continuous filament and ply yarns. Service ability, wear and abrasion, Definitions, methods for measuring abrasion resistance and evaluation of results, Fabric creasing and crease recovery testing, Thickness, Weight, Crimp.

Shrinkage, Wet ability, Shower-proofness, Water-proofness, Flame-resistance.

Unit IV APPAREL & ACCESSORIES TESTING

15 Hours

Tensile properties of seams and stitches, seam puckering, dimensional stability in apparel. Color fastness – washing, rubbing and light. Apparel accessories testing - fusible interlinings, buttons, zippers, elastic waistband, Velcro, sewing threads, snap fasteners, hook and eye.

Unit V STATISTICAL QUALITY CONTROL

15 Hours

Statistical Techniques: Concept of reproducibility and repeatability, methods pertaining to fibre, yarn and fabric testing, concept of quality, quality assurance, textile product leveling ,international quality parameters and standards like Uster standards and ASTM.

Text Books:

- Saville.B.P(1999), *Physical Testing of Textiles*, Woodhead Publishing Ltd, Cambridge, England.
- Sara J. Kadolph,(2007), *Quality Assurance for Textiles and Apparel*, Fairchild Books, 2nd revised edition, New York, United States.
- Jinlian Hu, (2008),*Fabric Testing*, 1st edition, Woodhead Publishing Ltd, Cambridge, England.

Reference Books:

- J.E. Booth, 1996, “*Principles of Textile Testing*” CBS publishers and Distributors.
- Elliot B. Grover, D.S. Hamby, 2011, *Handbook of Textile Testing and Quality Control*, Wiley India
B.TECH (FT) Page 115 Pvt Ltd, India
- K. Amutha, , 2016, *A Practical Guide to Textile Testing*, Woodhead Publishing India in Textiles, CRC Press, New Delhi

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Classified the necessity determination of yarn evenness and the properties of fabrics	K1,K2
CO 2	Utilized the principle and working of testing instruments of yarn evenness and fabrics	K3
CO 3	Categorized the yarn twist data and analysis of yarn testing and interpretation of the test results.	K4
CO 4	Justified the concept of testing of fabrics.	K5
CO 5	Discussed the Statistical Quality Control of yarns and fabrics.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	2	3	3	3
CO-2	2	3	3	2	3	2
CO-3	3	3	3	3	3	2
CO-4	3	3	2	1	1	2
CO-5	3	3	2	3	3	1

High Correlation – 46.6%, Medium Correlation –16.6%, Low Correlation –36.6%

TEXTILE TESTING

UCDR501

Semester : V
Category : Major Core Practical-XI
Class &Major: III B.Sc. Costume Design and Fashion

Credit : 4
Hours/Week : 4
Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Explain the fabric weight, Thickness, Tensile Strength and Stiffness of fabrics
CO 2	Experiment with Abrasion Resistance, Crease Recovery and Drape of fabrics
CO 3	Examine the tearing strength and Bursting Strength of fabrics
CO 4	Evaluate the Color Fastness of fabrics by Crock meter, Perspiro meter, Laundro meter and Pressing.
CO 5	Estimate the Shrinkage of the Fabrics.

Test the given sample for the following properties

1. DETERMINATION OF FABRIC FOR THE FOLLOWING TEST

- Lea strength
- Blend composition
- Thickness
- CRA of fabric

2. DETERMINATION OF FABRIC FOR THE FOLLOWING TEST

- Thickness gauge
- Fabric Pilling
- Fabric Bursting Strength
- Crease recovery

3. DETERMINATION OF FABRIC FOR THE FOLLOWING TEST

- washing fastness
- Rubbing fastness
- Perspiration Test

Text Books:

- J.E. Booth (2018), *Principles of Textile Testing*, CBS Publishers & Distributors Pvt Ltd.
- D. Gopalakrishnan, (2020), *Textile Testing*, DAYA Publishing House.

Reference Books

- V.K, Kothari, (1999), *Testing and Quality Management*, IAFLPublications.
- Booth. J.E, (1996), *Principles of Textile Texting*, CBS Publisher.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrated the fabric weight, Thickness, Tensile Strength and Stiffness of fabrics	K1,K2
CO 2	Constructed Abrasion Resistance, Crease Recovery and Drape of fabrics.	K3
CO 3	Inspected the tearing strength and Bursting Strength of fabrics	K4
CO 4	Justified the Color Fastness of fabrics by Crock meter, Perspirometer, Laundrometer and Pressing.	K5
CO 5	Test the Shrinkage of the Textile Fabrics.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	3	2	3
CO-2	3	3	3	3	1	2
CO-3	3	3	3	2	2	3
CO-4	3	3	3	3	2	3
CO-5	3	3	2	2	3	3

High Correlation = 73.3% Medium Correlation = 23.4% Low Correlation = 3.3%

COMPUTER AIDED DESIGNING

UCDR603

Semester : V
 Category : Major core Practical-XIV
 Class & Major: III B.Sc. Costume Design and Fashion

Credit : 4
 Hours/Week : 5
 Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Explain grade patterns for garments.
CO 2	Choose fashion designing software's and CAD Designer.
CO 3	Apply updated software's of coral draw and Photoshop in textile and fashion.
CO 4	Discover computerized designing and graphic design techniques.
CO 5	Design collections by fulfilling the objectives of the client and user requirements

1. CREATE GARMENT DESIGNS FOR THE FOLLOWING COLOR HARMONIES

- Mono chromatic color harmony
- Analogous color harmony
- Complementary color harmony
- Double complementary color harmony

- Neutral color

2. CREATE GARMENT DESIGNS FOR THE FOLLOWING ELEMENTS OF DESIGN

- Line
- Shape
- Size
- Color
- Texture

3. CREATE GARMENT DESIGNS FOR THE FOLLOWING PRINCIPLES OF DESIGN

- Balance
- Rhythm
- Emphasis
- Proportion
- Harmony

4. CREATE GARMENT DESIGNS FOR THE FOLLOWING SEASONS

- Summer
- Winter
- Spring
- Autumn

5. DRAFT AND GRADE PATTERNS FOR THE FOLLOWING GARMENTS

- Bib
- Jabla
- Salwar
- T-Shirt

6. CREATE GARMENT DESIGNS FOR THE FOLLOWING OCCASIONS

- Party wear
- Casual wear
- Wedding collection
- Sportswear (any sports)

Text Books

- Patrick John Ireland (1982), *Fashion Design Drawing & Presentation*, United States, 1982.
- Patrick John Ireland, Wiley, 1979, *Drawing and Designing Children's and Teenage Fashions*
- Patrick John Ireland,(1996), *Fashion Design Illustration: Men*, , B.T. Batsford Books, London.

Reference Books

- Binna Baling, 2007, *Fashion Sketch Book*, Fairchild Books, New York.
- Julian Seaman, (2001), *Foundation in fashion design and Illustration*, B. T. Batsford Books, London.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate grade patterns for garments.	K1,K2

CO 2	Develop CAD designer in garment industry.	K3
CO 3	Examine the diversified usage of Corel draw and Photoshop	K4
CO 4	Draft the pattern for all age wearers	K5
CO 5	Create the pattern blocks into various sizes of (S, M, L, and XL).	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	3	3	3
CO-2	2	3	3	3	3	3
CO-3	3	3	3	2	3	3
CO-4	3	3	3	2	3	1
CO-5	2	3	2	1	2	3

High Correlation = 73.3% Medium Correlation = 20% Low Correlation = 6.7%

FASHION ENTREPRENEURSHIP UCDM502

Semester : V	Credit : 4
Category : Major Core Paper -X	Hours/Week : 5
Class &Major: III B.Sc. Costume Design and Fashion	Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Outline entrepreneurship skills among the students in textile field.
CO 2	Develop the process and procedure of setting up, new enterprises.
CO 3	Construct organization & planning, production
CO 4	Mark the financial management, personnel, Industrial psychology
CO 5	Compose the safety and entrepreneurship development.

Unit I SCOPE OF ENTREPRENEURSHIP

12 Hours

Introduction to entrepreneurship, development of entrepreneurship, role of entrepreneurs in development of apparel and fashion industry, entrepreneurship with reference to fashion and apparel industry in India.

Unit II ORGANIZATIONS

11 Hours

Entrepreneurial support by state, central financial institutions, organizations. Government policies with reference to textile and apparel industry.

Unit III ENTREPRENEURSHIP IN APPAREL INDUSTRY**12 Hours**

Business planning – Starting a new venture related to apparel industry, essentials of a successful centre; Location & plant layout-factors, influencing plant location, building, structure, lighting, ventilation, material handling, availability of labour, material management and transportation.

Unit IV INDUSTRIAL MANAGEMENT AND THE ENTREPRENEUR**15 Hours**

Industrial sickness and remedies, tax planning, VAT, Patent Rules, Factory Act, Minimum wages, knowledge of exemptions & deductions. Health and safety Measures in Textiles and garment industries. Equipment Management, Inventory control- production control- quality control, cost control and business communication.

Unit V ENTREPRENEURSHIP DEVELOPMENT**15 Hours**

Role of education and training in EDP. Ideas about project identification. Role of trade fairs and exhibitions. Criteria for selection a project. Study of feasibility report. Role of Commercial Banks and other financial institutions in EDP. Functions of District Industries Centers (DIC). Brief idea about functions of Small Industries Service Institute (SISI), SIPCOT, TIIC and ITCOT. Definition of small-scale industry. Government concessions and encouragement to small-scale industry. Procedure for registration of SSI units.

Text Books:

- Charles E. Bamford Associate Professor of Strategy & Entrepreneurship and Garry D. Bruton, (2021), *Entrepreneurship: the art, science, and process for success*. McGraw Hill; 2nd edition.
- Fayolle. A (2007), *Entrepreneurship and new value creation*. Cambridge, Cambridge University Press

Reference Books

- Charles W L Hill, Steven L McShane, 2007, '*Principles of Management*', McGraw Hill Education.
- Singa, J.C & Mugali, V.N (1982), *Business Management: Theory and Practice*, Edition 5, McGraw Hill Education.

Course Outcomes

CO. No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate the Management principles adopted in Textile Industry.	K1,K2
CO 2	Build the costing, working capital, profit loss accounting in Textile Industry.	K3
CO 3	Analyze Perspective work study and Time study concepts	K4
CO 4	Interpret the entrepreneurship avenues in Textile Industry	K5
CO 5	Estimate the Rendering and presentation of Blue prints and ammonia prints	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	3	1	2
CO-2	2	2	3	1	2	2
CO-3	2	3	2	2	2	3
CO-4	3	3	3	2	2	3
CO-5	2	2	2	1	1	2

Higher Correlation = 36.7%, Medium Correlation = 50% Lower Correlation = 13.3%

FASHION STYLING-Practical UCDR504

Semester : V

Category : Major Elective -I

Class & Major: III B.Sc. Costume Design and Fashion

Credit : 3

Hours/Week : 4

Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Extend the styling and fashion stylist components and its real-time applications.
CO 2	Develop fashion awareness and fashion referencing via magazines, photography etc.,
CO 3	Construct the styling types and techniques.
CO 4	Justify the role of fashion stylist
CO 5	Compile the modern techniques of fashion styling and their applications

Unit I FASHION STYLING

11 Hours

Introduction to styling – qualities of a fashion stylist, Areas of working: magazine and editorial, print advertising television/commercial, catwalk, digital video and film, music, celebrities and red carpets, look book/catalogues/e-commerce, digital and online media, personal styling/image consulting, television(wardrobe department), prop styling and set design - case studies of stylist

Unit II RESEARCH FOR A STYLIST

10 Hours

Fashion awareness – style icons, Trend setting, fashion communication. Contextual studies – critical analysis. Fashion referencing – fashion magazines, photography, art, Icons and Inspiration.

Unit III STYLING TYPES AND TECHNIQUES

10 Hours

Fashion editorial styling, commercial styling, still-life styling, wardrobe styling, personal styling, celebrity styling, catalogue styling, newspaper styling, fashion show styling, contemporary fashion stylist, the stylist's kit, styling tips, techniques and quick fixes, Men's wear styling and case studies

Unit IV ROLE OF FASHION STYLIST**10 Hours**

Team working, organizing a test-shoot, communication, style inspiration and development, casting the model - professional models, street casting, scouting online. Location – studio, outdoor, sourcing cloths, editing the cloths, cloths for body type, Fitting and corrections.

Unit V FASHION IN MOTION**11 Hours**

Styling for the internet, online blogs and magazines, social media, catwalk shows and events, film and TV shows, Preparing for the red carpet. Anatomy, Hair texture, hair styling kit, hair colour, hair styles for women for different hair length, hair styles for men, Accessories – types and selection.

Text Book

- Jacqueline McAssey, Clare buckley,(2011), “*Basics Fashion Design 08: Styling*”, AVA publishing(UK) ltd
- Danielle Griffiths, (2016), “*Fashion stylist handbook*”, Laurence King publishing Ltd.

Reference Book:

- Crystal Wright,(2018), “*The Hair Makeup & Fashion Styling Career Guide: The Insider s Guide to a Successful Career in Print, Video, Film & TV*”, Motivational media production, LLC.

Course Outcomes

CO.No.	On completion of the course, the students will be able to	Bloom’s Level
CO 1	Explain the styling and fashion stylist components and its real-time applications.	K1,K2
CO 2	Experiment with fashion awareness and fashion referencing via magazines, photography etc.,	K3
CO 3	Function the styling types and techniques.	K4
CO 4	Assess the role of fashion stylist	K5
CO 5	Build the modern techniques of fashion styling and their applications	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	2	2	3
CO-2	3	3	3	3	3	2
CO-3	3	2	3	3	3	3
CO-4	2	2	1	1	3	3
CO-5	3	3	2	2	3	3

Higher Correlation =63.3%, Medium Correlation = 30%, Lower Correlation =6.7%

**BEAUTY CARE-Practical
UCDR505**

Semester : V
Category : Major Elective-II-practical
Class &Major: III B.Sc. Costume Design and Fashion

Credit : 3
Hours/Week : 4
Total Hours : 52

Course Objectives

CO No.	To enable the students
CO 1	Impart knowledge on beauty care
CO 2	Identify and analyze personal skin types
CO 3	Enhance their beauty through make up, hair styles and skin care
CO 4	Interpret the production control system and its evaluation
CO 5	Adapt the cost control applications in garment industry

1. Basics Treatments

- Threading
- Manicure
- Pedicure
- Mehendi application on hands

2. Face Make up and Treatments

- Bleaching for normal skin
- Facial –Normal skin
- Basic Make up
- Bridal Make up

3. Hair Styles and Treatments

- Basic Hair styles (any 5)
- Special Hair styles (any 2)
- Basic hair cuts
- Dandruff treatment
- Hair dye

Text Books

- Elizabeth M Reed,(2015), *Beauties: The Ultimate Cosmetic Makeover Guide. Book 1: Face and Skin* Quillpen Pty Ltd.

Reference Book

- Skin Deep by Bee Shapiro, 2017, *Published by Harry N Abrams.*
- Skincare, Hair Care, and Body Care Products, Julie Gabriel, 2010, *Petite Marie Limited.*

Course Outcomes

CO.No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate and Maintain personal beauty and hygiene	K1,K2
CO 2	Develop new hair styles	K3
CO 3	Examine the beauty products and their care	K4
CO 4	Evaluate the Present oneself with confidence and beauty	K5
CO 5	Construct the knowledge in fashion shows	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	1	3	1	3	3
CO-2	2	1	3	0	0	1
CO-3	2	2	2	1	1	1
CO-4	3	2	0	2	1	1
CO-5	3	3	3	2	2	3

High Correlation = 33.3% Medium Correlation = 26.6% Lower Correlation = 30%
 No correlation = 10%

FASHION PORTFOLIO-Practical UCDR503

Semester : V
 Category : Major Core Practical -XII
 Class &Major: III B.Sc. Costume Design and Fashion

Credit : 4
 Hours/Week : 5
 Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Classify the list of boards for the fashion portfolios.
CO 2	Identify the board which suits the customer profile.
CO 3	Construct the fashion portfolio requirements details.
CO 4	Decide the garments for the customized designs.
CO 5	Create the garments with suitable customer portfolios.

PORTFOLIO PRESENTATION AND DESIGN COLLECTION

1. Part A

Portfolio Presentation - with Customer profile, Inspiration board, Mood Board, Color board, Flat Sketch

Board, Illustration board, Swatch board, Trim board, Accessory board- for the following collection

- Fashion Show- with a theme – one ramp set
- Winter collection - 3garments
- Summer Collection -3 garments

Note

- Customer profile: capture photograph of your customer.
- Inspiration board: Image collection from books and magazines by scanning, Photography and drawing, use of objects for mood creation
- Mood board: develop a theme based on group discussion, mind mapping, brainstorming.
- Color board: spotting theme board, mood board and inspiration board arrive the colorboard.
- Flat sketch board: Develop front, side and back views

2. Part B

Construct the garments for all the above categories

Text Books

- Patrick John Ireland ,(2006), *Fashion Design Drawing and Presentation*, , B T Batsford Ltd.
- Patrick John Ireland, (2008), *New Encyclopedias of Fashion Details*, Publisher: Pavilion Books.

Reference Books

- Patrick John Ireland, (2008), *New Encyclopedia of Fashion Details*, Publisher: Pavilion Books.

Course Outcomes

CO. No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Explain the list of boards for the fashion portfolios.	K1,K2
CO 2	Develop the board which suits the customer profile and the theme of the portfolio.	K3
CO 3	Analyze the fashion portfolio requirements details.	K4
CO 4	Estimate the garments for the customized designs.	K5
CO 5	Formulate the garments with suitable customer portfolios.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	2	2	3
CO-2	3	3	3	3	3	2
CO-3	3	3	2	2	3	3
CO-4	3	3	0	0	3	3
CO-5	3	3	1	2	2	1

**Higher Correlation =63.3%, Medium Correlation = 23.3% , Lower Correlation =6.6%
No Correlation = 6.7%**

**GARMENT QUALITY CONTROL
UCDM601**

Semester : VI
Category : Major Core -XI
Class & Major : III B.Sc. Costume Design and Fashion

Credit : 4
Hours/Week : 5
Total Hours :65

Course Objectives

CO No.	To enable the students to
CO 1	Illustrate the garment quality control
CO 2	Apply the quality control system and its procedures
CO 3	Analyze the production control and its specifications
CO 4	Interpret the production control system and its evaluation
CO 5	Applicate the cost control techniques in garment industry.

Unit I INTRODUCTIONS TO GARMENT QUALITY CONTROL 11 Hours

Basics of Quality Control Definition and Scope of Quality Control – Establishing Merchandising Standards – Establishing Raw Material Quality Control specifications – Quality Control of Raw Material.

Unit II QUALITY CONTROL SYSTEM 15 Hours

Quality Control System Establishing Processing quality specification – Training Quality Control Personnel –The Quality Standard Control – Quality Control Inspection, Procedures for processing – Quality control of finished garments – Quality control and Government contacts – Quality Control for Packaging, Warehousing and shipping – Statistical Quality Control, Sampling plans – industry – wide quality standards.

Unit III PRODUCTION CONTROL AND ITS SPECIFICATIONS 12 Hours

Basics of Production control Function of Production control – Production, Analysis – Quality Specifications – Quantitative specifications – Scope of Apparel Manufacturing Activity – Coordinating departmental Activities – Distribution of Documents and Records.

Unit IV QUALITY MANAGEMENT 12 Hours

Quality – Evolution of Quality management – Quality function and quality planning – Basic concepts of Total Quality Management (TQM) – Principles of TQM – Quality Trilogy – Fourpillars of TQM – PDCA cycle & PDSA cycle – Kaizen concept – 5S Philosophy – Quality circles.

Unit V ENVIRONMENTAL MANAGEMENT SYSTEM & COST CONTROL 15 Hours

Environmental Management System (EMS) – Meaning & Definition – Elements of EMS – Benefits of EMS – Environmental Policies – Implementation of ISO14000 study on other management

system:SA8000, OHSAS18000 and WRAP. Cost Control, Function of Cost Control: Types of Costs and Expenses – Apparel Manufacturing Cost Categories – Sales Cost Control – Purchasing Cost Control – Production Cost Control – Administration cost Control – Cost Ratio Policies – the manufacturing Budget – Cash flow Control – Standard Cost Sheet, Break–Even Charts

Text Books

- Solinger , Jacob (1961), *Apparel Manufacturing Analysis*, New York, Textiles books,
- Pradip V Mehta, SathishK Bhardwaj(1998), *Managing Quality In The Apparel Industry*, New Age International.

References books:

- Salinger, Jacob Apparel, 2001 “*Manufacturing Analylsisl, New York*”, *Textile Books Futs*
- A.J. Chuter,2004, Introduction to Clothing Production Management, , *Second Edition, Black Well Publishing, Second Edition.*
- Apparel Merchandising, Robin Mathew,2008, *First Edition, Book Enclave Publishing,*
- Satish Tiwari,2000,*Textile Industry Development and Growth*, First Edition, Anmol Publications Pvt. Ltd.

Course Outcomes

CO. No.	On completion of the course, the students will be able to	Bloom’s Level
CO 1	Demonstrate the garment quality control	K1,K2
CO 2	Develop the quality control system and its procedures	K3
CO 3	Examine the production control and its specifications	K4
CO 4	Evaluate the production control system and its evaluation	K5
CO 5	Construct the cost control applications in garment industry.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	3	3	3
CO-2	3	3	1	1	3	3
CO-3	2	3	3	3	3	3
CO-4	2	3	2	2	2	3
CO-5	3	3	2	1	1	2

High Correlation = 63.3%, Medium Correlation =23.3%, Lower Correlation =13.3%

DIGITAL MARKETING
UCDM602

Semester : VI
Category : Major Core-XII
Class & Major: III B.Sc. Costume Design and Fashion
Course Objectives

Credit : 3
Hours/Week : 4
Total Hours : 52

CO No.	To enable the students
CO 1	Explain the basics of Digital Marketing
CO 2	Identify the SEO and SMO Techniques
CO 3	Categorize the digital marketing strategies
CO 4	Importance of PPC and online marketing methods
CO 5	Elaborate the Display advertising and its tools

Unit I Introduction to Digital Marketing:

12 Hours

Meaning of Digital Marketing, Differences from Traditional Marketing, Return of Investments on Digital Marketing vs. Traditional Marketing, E Commerce, Tools used for successful marketing, SWOT Analysis of Business for Digital Marketing, Meaning of Blogs, Websites, Portal and Their Differences, Visibility, Visitor Engagement, Conversion Process, Retention, Performance Evaluation.

Unit II Search Engine Optimization (SEO):

10 Hours

On page Optimization Techniques, Off Page Optimization Techniques, Preparing Reports, Creating Search Campaigns, Creating Display Campaigns.

Social Media Optimization (SMO): Introduction to Social Media Marketing, Advanced Facebook Marketing,

Unit III The Digital users in India

10 Hours

Digital marketing Strategy- Consumer Decision journey, POEM Framework, Segmenting & Customizing messages, Digital advertising Market in India, Skills in Digital Marketing, Digital marketing Plan.

Unit IV Terminology used in Digital Marketing

10 Hours

PPC and online marketing through social media, Social Media Marketing, Keyword advertising, Google web-master and analytics overview, Affiliate Marketing, Email Marketing, Mobile Marketing

Unit V Display adverting

10 Hours

Buying Models, different type of ad tools, Display advertising terminology, types of display ads, different ad formats, Ad placement techniques, important ad terminology, Programmatic Digital Advertising.

Text Books

- S.Gupta , (2022), *Digital Marketing*, , McGraw-Hill
- , H. Annmarie , A. Joanna (2009), *Quick win Digital Marketing*, Paperback edition

References books

- Nitin Kamat, Chinmay Nitin Kamat (1975), *Digital Marketing-Himalaya*
- D. Ryan,(2008), *Marketing Strategies for Engaging the Digital Generation*, *Digital Marketing*,Oxford University Press

Course Outcomes

CO. No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Illustrate the basics of Digital Marketing	K1,K2
CO 2	Experiment with the SEO and SMO Techniques	K3
CO 3	Function the digital marketing strategies	K4
CO 4	Prioritize the PPC and online marketing methods	K5
CO 5	Build the Display advertising and its tools	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	0	0	0	2
CO-2	3	0	0	1	2	2
CO-3	3	2	0	1	2	2
CO-4	3	2	0	1	2	2
CO-5	3	3	3	0	2	3

Higher Correlation =30% , Medium Correlation =33.3% , Lower Correlation=10%
No Correlation = 26.7%

PROJECT UCDP601

Semester : VI

Category : Major Core-XII(Project)

Class &Major: III B.Sc. Costume Design and Fashion

Credit : 8

Hours/Week : 5

Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Show the readiness to enter the fashion industry.
CO 2	Choose the geography, technology, political systems, religion and economic forces in textile and apparel design and production.
CO 3	Examine the influence of state, federal, and international regulations on the development, production and distribution of apparel and textile products.

CO 4	Decide the employment opportunities and the qualifications of fashion industry careers
CO 5	Design the interrelationships of physique apparel production on fabric, style, price point, target market and art element and principles

From Concept to Creation: A Step-by-Step Guide to Fashion Design

Final year under graduate students at the end of final semester under goes a minor research work. Based on the curriculum/ area of interest by the individual has been focused with objectives, and detailed work on literature, methodology, result analysis and submitting as bound work with summary, conclusion with evidence of tools used, appendix. This will be evaluated as per the scheme.

Evaluation	CIA (Internal)	ESE (External)
Inspiration and Research	10	
Sketching and Concept Development	10	
Choosing Fabrics and Materials	10	10
Creating a Prototype	10	10
Production and Manufacturing	20	10
Viva Voce		10
Total	60	40

Step 1: Inspiration and Research

The first step in any fashion design project is to gather inspiration and do research. This involves looking at current trends, exploring historical fashion, and finding inspiration in art, nature, and everyday life. Take note of the colors, textures, and shapes that catch your eye, and start to develop a vision for your project.

Step 2: Sketching and Concept Development

Once you have gathered your inspiration and done your research, it's time to start sketching your ideas. Sketching allows you to develop your ideas and refine your vision. Start with rough sketches, and then refine your designs as you go. Consider the fabrics, colors, and textures that you want to use in your designs, and think about how you can incorporate them into your sketches.

Step 3: Creating a Technical Drawing

After you have sketched out your ideas, it's time to create a technical drawing. Technical drawings are detailed drawings that show every aspect of your design, including measurements, construction details, and fabric choices. This drawing will be used as a blueprint for your final product, so it's important to be as detailed as possible.

Step 4: Choosing Fabrics and Materials

Once you have a technical drawing, it's time to start choosing fabrics and materials. Consider the look and feel that you want to achieve with your design, and choose fabrics and materials that will help you achieve that vision. It's also important to consider the cost of the materials, as this will impact the overall cost of your design.

Step 5: Creating a Prototype

With your technical drawing and materials in hand, it's time to start creating a prototype. This involves creating a sample of your design to test the fit, feel, and overall look of the final product. Start by creating a mock-up of your design using inexpensive materials, and then refine your prototype until you have a final product that meets your vision.

Step 6: Testing and Refining

Once you have a prototype, it's time to test and refine your design. Wear the prototype yourself or have someone else wear it to ensure that it fits and moves as it should. Make any necessary adjustments and refinements until you have a final product that meets your vision and quality standards.

Step 7: Production and Manufacturing

Once you have a final product, it's time to start production and manufacturing. This involves sourcing materials, cutting fabric, and assembling your design. Depending on your production needs, you may choose to manufacture your design yourself, or you may choose to work with a manufacturer who can produce your design on a larger scale.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Interpret Comprehensive research to solve different problems of society	K1,K2
CO 2	Build primary characteristics of quantitative research and qualitative research.	K3
CO 3	Discover familiar with the steps involved in identifying and selecting a good theme to use in a study or to develop line in fashion.	K4
CO 4	Decide research problem and develop same for their study.	K5
CO 5	Build the showcase their collection in the form of exhibition and fashion show	K6

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	3
CO2	3	2	3	2	3	3
CO3	1	3	2	2	2	1
CO4	3	2	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 70%

Moderate Correlation: 23%

Low Correlation:7%

FASHION DRAPING -Practical UCDR602

Semester : VI

Category : Major Core Practical-XIII

Class &Major: III B.Sc. Costume Design and Fashion

Course Objectives

Credit : 4

Hours/Week : 6

Total Hours : 78

CO No.	To enable the students
CO 1	Show the basic draping methods of basic bodice blocks, dart manipulation and pleats.
CO 2	Choose the neckline variations and its components
CO 3	Examine the types of skirts in draping method.
CO 4	Decide the kinds of sleeves in fashion draping
CO 5	Design the garment by draping techniques for all agers.

I. Prepare the following samples using the Draping Method

- Remove creases by ironing the fabric.
- Straighten the fabric
- Basic bodice - Front and Back
- Dart Manipulation
- Pleats, Darts, Tucks and Gathers

II. Neckline variations

- Boat neck
- Cowl
- Key hole
- Halter

III. Drape the Following Yokes

- Simple Yoke
- Yoke with Fullness within the Yoke Shirt Yoke
- Midriff Yoke

IV. Skirts

- Flared skirt
- Pleated skirt
- Hip yoke skirt
- Umbrella skirt

V. Sleeves

- Basic sleeve
- Puff sleeve
- Bell Sleeve
- Petal sleeve

Text Books

- Helen Joseph and Armstrong, (2013), *Draping for Apparel Design*, 3rd Edition.
- Connie Amaded and Crawford (2018), *The Art of Fashion Draping*, Bloomsbury Academic

References

- Karolyn Kiisel, 2013, *The Complete Course, Draping*, Laurence King Publishing.
- Hilde Jaffe, (2000), *Draping for Fashion Design*, Pearson Education India.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate the basic draping methods of basic bodice blocks, dart manipulation and pleats.	K1, K2
CO 2	Build the neckline variations and its components	K3
CO 3	Assess the types of skirts in draping method.	K4
CO 4	Evaluate the kinds of sleeves in fashion draping	K5
CO 5	Compose the garment by draping techniques for all ages.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	1	3	0
CO-2	3	3	3	0	3	3
CO-3	3	3	0	0	2	2
CO-4	3	3	0	0	2	2
CO-5	3	3	0	2	3	3

Higher Correlation =56.6% , Medium Correlation= 16.6%, Lower Correlation =3.3%
No Correlation = 23.4%

FASHION PHOTOGRAPHY-Practical UCDR603

Semester : VI

Category : Major Core Practical -X

Class &Major: III B.Sc. Costume Design and Fashion

Credit : 4

Hours/Week : 5

Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Extend their understandings of Still Cameras
CO 2	Organize the still SLR-camera, Digital SLR camera parts.
CO 3	Discover the basic photography images and its types.
CO 4	Interpret the film speed - Exposure control & composition rules
CO 5	Discuss the Applications of Lens.

1. Type of still cameras

- View Camera
- Viewfinder Camera
- Single Lens Reflex Camera
- Twin Lens Reflex Camera

2. Part of still SLR-CAMERA. / Digital SLR camera.

- Viewfinder & Shutter Release
- Shutter Speed Control
- Film Speed Control & F-Stop Control
- Film Compartment & Flash
- Hot Shoe Mount & Lens Ring Mount

3. BASIC -Photographic Image:

- Motion picture Photographic Emulation
- Film base
- Latent image: image formation,
- Grain, graininess.

4. Photography:

- Product Photography
- Modeling Photography
- Indoor and Outdoor Photography

5. Special effects:

- Black and White Image
- Gray Scale Image
- Mono Color Image
- Negative Image
- Cut Color Image

6. Image editing:

- Collage work
- Creative image editing
- Creative layout

7. Video Making

- Adding music and voice
- Editing, cutting
- Animations and effects
- Changing background
- Video Content & Script

Text Books:

- Bruce Smith (Author) 28 October 2008 Fashion Photography: A Complete Guide to the Tools and Techniques of the Trade, Publisher Amphoto Books
- Eugenie Shinkle (Author) 15 October (2017) Fashion Photography: The Story in 180 Pictures Publisher Aperture

References Books:

- John Hedge, John HedgeCo, UK, 1992, *Photography Course*

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate the applications of Still Cameras	K1,K2
CO 2	Construct the still SLR-camera, Digital SLR camera parts.	K3
CO 3	Examine the basic photography images and its types.	K4
CO 4	Assess the film speed - Exposure control & composition rules	K5
CO 5	Improve the Applications of Lens.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	0	0	3	3
CO-2	1	1	1	1	3	3
CO-3	3	3	0	0	3	3
CO-4	1	1	1	1	3	2
CO-5	1	1	0	0	2	3

Higher Correlation =40% Medium Correlation =6.6% Lower Correlation =33.3%
No Correlation = 20%

HOME TEXTILE-Practical

UCDR604

Semester : VI

Category : Major Elective-II-practical

Class &Major: III B.Sc. Costume Design and Fashion

Credit : 3

Hours/Week : 5

Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Select the terminologies related to home textile products
CO 2	Experiment with the proper product measurements and size charts
CO 3	Compare the characteristics of fabrics to their application and its utilization.
CO 4	Survey of Textile application in Home Furnishing
CO 5	Improve the categorized application of home textiles.

Prepare the following Samples (Design / Sketch 5 designs and construct Two)

1. To design and construct different types of Pillow Cover – any 2 styles
2. To design and construct different types of Bolster – any 2 styles
3. To design and construct different types of Apron – any 2 styles
4. To design and construct different types of Mitten – any 2 styles
5. To design and construct different types of Cushion Cover – any 2 styles
6. To design and construct different types of Window Curtain – any 2 styles
7. To design and construct different types of Table Cover – any 2 styles
8. To design and construct different types of Furniture Cover – any 2 styles
9. To design and construct different types of Bath Mat – any 2 styles
10. To design and construct Bed spread with Embroidery & Decorative details – any 1 style

Text Books:

- Home Textiles, T Karthik and D Goplalakashnan, Daya Publishing House, 2018
- Home Furnishing, V. Ramesh Babu and S. Sundaresan, Woodhead Publishing India, 2018

References:

- Interior decorating effects, Stewart and sally Walton, 2000, *Lorenz books*.
- Dorothy Gates, 2000, *The essential guide to upholstery* Merehurst Ltd, London.

- Hamlyn octopus, 2013, *Cushions and Pillows- professional skills –made easy*, Octopus publishing group, New York.
- Magi Mc McCormick Gordon,2000, *The ultimate sewing Book 200 sewing ideas for you and your home*, Collins and Brown,London.
- Cheryl Mendelson, 2005, *Home Comforts-the arts and science of keeping home*, Scriber, New York.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Demonstrate the terminologies related to home textile products	K1,K2
CO 2	Identify the proper product measurements and size charts	K3
CO 3	Construct characteristics of fabrics to their application and its utilization.	K4
CO 4	Simplify the Textile application in Home Furnishing	K5
CO 5	Invent the categorized application of home textiles.	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	3	3	2	3
CO-2	3	3	3	2	1	2
CO-3	3	3	3	3	2	3
CO-4	3	3	3	3	2	3
CO-5	2	3	3	3	1	2

Higher Correlation = 70% Medium Correlation = 23.3%, Low Correlation =23.3%

FASHION AARI WORK-Practical UCDR605

Semester : VI

Category : Major Elective-II -practical

Class &Major: III B.Sc. Costume Design and Fashion

Credit : 3

Hours/Week : 5

Total Hours : 65

Course Objectives

CO No.	To enable the students
CO 1	Select the design for Aari embroidery
CO 2	Experiment with the proper types of Aari stitches
CO 3	Compare the characteristics of design garments using components of aari work
CO 4	Survey advanced stitches used for Aari work
CO 5	Improve the design a garment combining the components of aari embroidery

List of experiments:

1. Running stitch and its variation
2. Water filling
3. Leaf stitch
4. Chain stitch and its variations
5. Knot stitch and its variations
6. Chamki stitch and its variations
7. Bead stitch and its Variations
8. Katta stitch
9. Patch work
10. Mirror work
11. Cut work and its variations
12. Feather work
13. Zardhosi and its variations
14. Emboss stitch and its variations

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO 1	Illustrate principles and elements of design	K1,K2
CO 2	Identify the importance of color in the fashion world	K3
CO 3	Analyze fashion concepts	K4
CO 4	Compare the marketing strategies	K5
CO 5	Invent the product development cost and price of the garment	K6

CO-PSO MAPPING

PSO /CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO-1	3	3	2	2	0	3
CO-2	3	3	3	2	0	3
CO-3	3	3	3	3	3	3
CO-4	3	3	2	2	0	1
CO-5	3	3	1	2	2	3

**Higher Correlation = 60%, Medium Correlation = 23.3%, Low Correlation =6.7%
No Correlation = 10%**

III & IV Evaluation Components of CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
V	Major Core Paper-IX	UCDM501	TEXTILE TESTING & STATISTICAL APPLICATION	Assignment	Seminar
	Major Core Practical -X	UCDR501	TEXTILE TESTING-PRACTICAL	Assignment	Seminar
	Major Core Practical-XI	UCDR502	COMPUTER AIDED DESIGNING-PRACTICAL-II	Exhibits	Exhibits
	Major Core Practical-XII	UCDM502	FASHION ENTREPRENEURIAL MANAGEMENT	Exhibits	Exhibits
	Major Elective -I	UCDR504/ UCDR505	FASHION STYLING, BEAUTY CARE-PRACTICAL	Assignment	FinalSample Submission
	Major Core X	UCDR503	FASHION PORTFOLIO-PRACTICAL	Fashion Show	Final Design Submission
VI	Major Core -XI	UCDM601	GARMENT QUALITY CONTROL	Assignment	Seminar
	Major Core-XII	UCDM602	DIGITAL MARKETING THEORY	Assignment	Seminar
	Major Core Practical-XII	UCDP604	PROJECT WORK	Exhibits	Exhibits
	Major Core Practical-XIII	UCDR602	FASHION DRAPING-PRACTICAL	Exhibits	Exhibits
	Major core Practical-XIV	UCDR603	FASHION PHOTOGRAPHY-PRACTICAL	Assignment	Seminar
	Major Elective-II	UCDR604/ UCDR605	HOME TEXTILE FASHION AARI WORK / PRACTICAL	Exhibits	Exhibits

DEPARTMENT OF CLINICAL NUTRITION AND DIETETICS

PREAMBLE

UG: Programme profile & the syllabi of courses offered in the semester V and VI along with III &

IV evaluation components (with effect from 2022 - 2025 batch onwards).

PROGRAM SPECIFIC OUTCOME (PSO):

PSO	On completion of this programme, students will be able to
PSO1:	Identify the fundamentals of nutrition, dietetics and food microbiology to promote health and administer healthy eating principles throughout the community and the nation
PSO2:	Deal with understanding of food groups, nutrients, nutrition & health, metabolism & acid base balance of body, energy.
PSO3:	Detailed study of macro and micro nutrients, dietary modification for inborn errors of metabolism.
PSO 4:	Evaluate, adopt and apply the best practices relating to health, safety, quality and client satisfaction in the field of Nutrition and Dietetics.
PSO 5:	Apply the principles and theoretical knowledge in nutrition, dietetics, biochemistry and physiology through practical courses and internships in hospitals.
PSO 6:	Enable pursuit of higher education, research and career in Nutrition, Food Service Management and Dietetics and health education causing meaningful societal Impact.

PROGRAMME PROFILE – B. Sc CLINICAL NUTRITION AND DIETETICS

Semester	Part	Category	Course code	Course Title	Previous course code	Hrs per week	Credit
							Min / Max
I	I	Language/ AECC-II /	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil I/ Advanced Tamil I/ Hindi I/ French I	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
		Tamil (2 Levels)					
		Hindi /					
		French					
	II	Communicative		English for Communication – I			
		English I / AECC-I (2 Levels)	UCEL101/ UCEL102	(Stream – I)/ English for Communication – I (Stream –II)	--	5	3/4
		Core I / DSC – I	UCNM101	Food Science	--	4	4
		Core II / DSC - II	UCNM102	Human Nutrition - I	--	4	4
		Core Practical I	UCNR101	Food Science Practical	--	3	2
	III	Allied I / GE I	UBCA101	Biochemistry	--	4	3
		Allied Practical	UBCR101	Biochemistry Practical	--	3	2
		PE	UPEM101	Professional English I	--	6	4
	IV	Value Education / SEC			--	2	1
TOTAL						36	26/28

II	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL207 / UTAL208 / UHIL202 / UFRL202	Basic Tamil II/ Advanced Tamil II/ Hindi II/ French II	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4	
	II	Communicative English / AECC-II (2 Levels)	UCEL201 / UCEL202	English for Communication - II (Stream – I)/ English for Communication – II (Stream –II)	--	5	¾	
	III	Core III / DSC – III	UCNM201	Human Nutrition - II	--	4	4	
		Core IV / DSC – IV	UCNM202	Human Physiology		4	3	
		Core Practical II	UCNR201	Nutrient Analysis and Physiology Practical	--	3	2	
		Allied II/ GE -II	UCNA201	Food Service Management	--	3	3	
		Allied II practical PE	UCNR201 UPEM201	Quantity Cookery Practical Professional English II	-- --	3 6	2 4	
	IV	Non Major Elective (SEC)			--	3	2	
V	Extension activity/ Physical Education/NCC	--	--	--	-	½		
TOTAL							36	27/30
III	I	Language/ AECC-II / Tamil (2 Levels) Hindi/ French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil III/ Advanced Tamil III/ Hindi III/ French III	UTAL305/ UTAL306/ UHIL301/ UFRL301	5	¾	
	II	Communicative English / AECC-I (2 Levels)	UENL309/ UENL310	English for Communication III (Stream – I)/ English for Communication III (Stream –II)	UENL307/ UENL308	5	¾	
	III	Core V / DSC - V	UCNM301	Medical Nutrition Therapy - I	---	5	5	
		Core Practical III	UCNR302	Medical Nutrition Therapy Practical	---	3	2	
		Allied III/ GE -III	UMBA301	Basics of Food Microbiology	---	4	3	
		Allied III/ GE -III	UMBR301	Food Microbiology Practical	---	3	2	
	IV	Online Course		NPTEL / Spoken Tutorial	--	3	½	
		Value Education/ SEC			--	2	1	
TOTAL						--	30	20/23
IV	I	Language/ AECC-II / Tamil (2 Levels) Hindi/ French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil IV/ Advanced Tamil IV/ Hindi IV/ French IV	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	¾	
	II	English / AECC-I (2 Levels)	UENL409/ UENL410	English for Communication – IV (Stream – I) /	UENL407/ UENL408	5	¾	

				English for Communication – IV (Stream – II)				
	III	Core VI / DSC – VI	UCNM401	Community Nutrition	---	4	4	
		Core VII / DSC - VII	UCNM402	Nutrition Through Life Cycle	---	4	4	
		Core Practical IV	UCNR401	Community Nutrition Practical	---	3	2	
		Allied IV/ GE –IV	UMAA401	Basics of Statistics	---	4	3	
	IV	Non Major Elective			--	3	2	
		Soft Skill/ SEC			--	2	1	
	V	Extension Activity/ Physical Education/ NCC			--	-	- /2	
TOTAL							30	22/26
V	III	Major Core VII / DSC – VII	UCNM501	Clinical Nutrition	--	5	5	
		Core VIII/ DSC - VIII	UCNM502	Principles of Food Preservation	---	5	5	
		Core IX / DSC – IX	UCNM503	Food Product Development and Entrepreneurship	---	5	5	
		Major Elective-I / DSE – I	UCNO501	Scientific Writing in Nutrition Research	--	5	4	
			UCNO502	Health Psychology	--			
		Core Practical V	UCNR501	Clinical Nutrition Practical	---	4	3	
		Core IX / DSC – IX	UCNP501	Project	---	4	4	
Value Education/ SEC			---	2	1			
TOTAL							30	27
VI	III	Core X / DSC – X	UCNM601	Medical Nutrition therapy-II	---	6	6	
		Core XI / DSC – XI	UCNM602	Nutrition Education and Counseling	---	6	6	
		Core XII / DSC - XII	UCNM603	Sports Nutrition	---	5	5	
		Core XIII / DSC - XIII	UCNM605	Comprehensive Viva voce	--	-	1	
		Core Practical VI	UCNR601	Medical Nutrition therapy-II Practical	--	6	3	
		Major Elective – II / DSE – II	UCNO601	Herbal Remedies& Alternative Therapy	--	5	4	
	UCNO602		Human Development	--				
	UCNO603		Food Hygiene and Sanitation	--				
	III	Internship			--		-/1	
	IV	Soft Skill/ SEC			--	2	1	
V	Extension activity/ Physical Education/ NCC			--	-	-/2		
TOTAL							30	26/29
GRAND TOTAL							192	148/163

COURSES OFFERED TO OTHER DEPARTMENTS

EXTRA CREDIT EARNING PROVISION (Only for Interested Students)

Semester	Part	Category	Course Code	Course Title	Credit
VI	III	Self Study paper	UCNS601	Case Study	2

EXPERIENTIAL LEARNING OFFERED IN SEMESTER V & VI

Semester	Course Code	Course Title	Assessment
V	UCNM501	Clinical Nutrition	Component III
VI	UCNM604	Food Service Management	Component IV

CLINICAL NUTRITION

UCNM501

Semester : V

Category : Core VII/ DSC-VI

Class & Major: III B.Sc Clinical Nutrition and Dietetics

Credits :5

Hours /Week :5

Total Hours: 65

Course Objectives

CO No.	To enable the students to
CO -1	Learn the basic principles of clinical nutrition
CO -2	Understand the clinical significance of biochemical findings
CO -3	Develop skill and techniques in food preparation with conservation of nutrients and Palatability using cooking methods generally employed
CO -4	Gain Knowledge about the usage and importance of whole grains, pulses and vegetables in daily Basis
CO -5	Employable as dieticians and establish their own diet clinics

UNIT I METABOLISM

12 Hours

Carbohydrate - Glucose transport. glycolysis. metabolism of lactate and pyruvate. citric acid cycle. gluconeogenesis. pentose phosphate pathway. Amino acid - Intermediary metabolism and urea cycle. Lipid - Intestinal resynthesis of TG, transport, oxidation of fatty acids, biosynthesis of cholesterol.

UNIT II GENETIC CONTROL OF METABOLISM

13 Hours

Nucleic acids, DNA replication, RNA – Synthesis, types and functions, Genetic code, protein biosynthesis, Recombinant DNA Technology.

UNIT III BIOCHEMICAL CHANGES DUE TO DISORDERS OF METABOLISM

13 Hours

Diabetes mellitus, Inborn errors of metabolism with respect to lactose, galactose, phenyl alanine and uric acid (Gout).

UNIT IV DIGESTIVE SYSTEM

13 Hours

a. Diarrhoea, constipation. Gastritis, ulcers, colitis, malabsorption syndrome –Nutritional implications.

b. Metabolic and nutritional implications of Hepatitis. Cirrhosis of liver. Hepaticcoma. Pancreatitis. Cholecystitis and Cholelithiasis.

UNIT V RENAL SYSTEM

14 Hours

a. Metabolic and nutritional implications of Nephritis. Nephrotic syndrome. Renal failure. Renal calculi and Dialysis. b. Water and electrolyte losses and replenishment. effect of dehydration and water intoxication.

Text Books

- Eastwood, M. A. (2003). Principles of human nutrition. Blackwell Science.
- Lieberman, M., Peet, A., & Lieberman, M. (2015). Marks' Essentials of Medical Biochemistry: A clinical approach. Wolters Kluwer.

Reference Books

- Murray, R. (1988). 1988 Harper's Biochemistry. Appleton & Lange.
- Sharma, D., & Sharma, D. (2015). Nutritional biochemistry. CBS Publishers & Distributors Pvt. Ltd.

e-Resources

- www.eatright.org
- www.ipmglobal.org
- www.nhlbi.nih.gov

Course Outcome

CO. No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the basic metabolic processes in the body	K1, K2
CO-2	Compare the normal and abnormalities metabolic conditions in body	K2
CO-3	Analyze normal functioning with diseases conditions	K4
CO-4	Diagnose diseases and to learn the diagnostic procedure for the same	K5
CO-5	Develop strategies to address metabolic and nutritional challenges in the context of renal system disorders.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	1	1	1
CO-2	3	3	2	2	2	3
CO-3	3	3	2	3	3	3
CO-4	3	2	2	2	3	3

CO-5	3	3	3	3	3	3
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High Correlation: 60%

Medium Correlation: 30 %

Low Correlation:10 %

PRINCIPLES OF FOOD PRESERVATION

UCNM502

Semester : V

Credits :5

Category : CoreVIII/ DSC-VIII

Hours/Week: 5

Class & Major: III B.Sc Clinical Nutrition and Dietetics

Total Hours :65

Course Objectives

CO No.	To enable the students to
CO -1	Obtain knowledge about food preservation.
CO -2	Analyze proper utilization of foods and prevent wastes
CO -3	Gain knowledge about various packaging materials and importance of packaging and be able to select appropriate packaging material for a variety of food stuffs.
CO -4	Understanding the importance of food labeling.
CO -5	Delay or prevention of growth of microorganisms in the food.

UNIT I - FOOD PRESERVATION – INTRODUCTION

12 Hours

Introduction-Importance and principles of preservation, food spoilage - causes of spoilage, spoilage of various foods and food products.

UNIT – II - METHODS OF FOOD PRESERVATION:

13 Hours

Traditional methods-salting, pickling and drying. Preservation as sugar concentrates - Jams, Jelly, Marmalades and Preserves. Fruit Juice Beverages - Preparation and preservation. Preparation of candied fruits.

UNIT –III METHODS OF FOOD PRESERVATION:

13 Hours

Use of high temperatures- Drying and sterilization, canning, pasteurization, Blanching Use of Low temperatures - Refrigeration and freezing, Irradiation

UNIT -IV FOOD ADDITIVES

13 Hours

Definition, uses of additives, characteristics of chemical additives, intentional food additives, permitted amounts; Food standards –BIS,AGMARK, FSSAI. Food adulteration – types of adulterants, intentional adulterants, incidental adulterants.

UNIT –V CONVENIENCE FOODS

14 Hours

Processing & preservation techniques - ready-to-cook, ready-to-use, ready-to serve and ready-to-eat. Packaging: Functions of Packaging, packing materials and forms, special packaging - military and space foods and intelligent packaging

Text Books

- Sivasankar, B. (2002). **Food Processing and preservation. Prentice Hall of India.**
- Grumezescu, A. M. (2017). *Food preservation.* Academic Press.

References

- Manay, N. S., & Shadaksharaswamy, M. (2008). *Foods: Facts and principles*. New Age International Ltd.
- Khetarpaul N, (2005)*Food Processing and Preservation*, Daya Publishing House, New Delhi,

e-Resources

- <https://www.youtube.com/watch?v=WWGRTSbvef0>
- <https://www.youtube.com/watch?v=8va4id8BA0o>
- <https://www.youtube.com/watch?v=osqfOuOs81s>
- <https://www.youtube.com/watch?v=MIT5EU4U4sQ>
- https://www.youtube.com/watch?v=uNKq9iIH_oE

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Identify the spoilage in fresh and processed foods and describe the physical, chemical and biological quality loss in food.	K1, K2
CO-2	Analyze the methods implemented to preserve foods with desirable properties balancing social and cultural norms.	K3
CO-3	Classify and explain food additives, food adulterants and current trends in food standards related to food safety practices.	K4
CO-4	Distinguish various convenience foods processing and preservation techniques; applying emerging technologies maintaining sustainability and ecological balance.	K5
CO-5	Develop the various methods & materials in food packaging with emphasis on current technological advances.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	1	1	1
CO-2	3	3	2	2	2	2
CO-3	3	2	2	2	2	2
CO-4	3	2	2	2	3	3
CO-5	3	3	3	3	3	3

High Correlation : 43%

Medium Correlation: 46.5%

Low Correlation:10 %

FOOD PRODUCT DEVELOPMENT AND ENTREPRENEURSHIP

UCNM503

Semester : V
Category : Core IX/ DSC-IX
Class &Major: III B.Sc Clinical Nutrition and Dietetics

Credits : 5
Hour/Week: 5
Total Hour: 65

COURSE OBJECTIVES

CO NO	To enable the students to
CO-1	Define the food products and examine their diverse classifications.
CO-2	Understand the steps involved in new food product development.
CO-3	Learn the process of formulating recipes, considering factors such as taste, texture, nutritional content, and shelf-life.
CO-4	Create awareness about entrepreneurship as an effective to a “White collar job”.
CO-5	Develop products that are in line with consumer demands.

UNIT I- INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT 12 Hours

Food products, definition, Classification, Characterization Reasons for new food product development, Factors shaping new product development-Social concerns, health concerns impact of technology and market place influence .Utilizing traditional foods, unconventional sources, functional, nutraceuticals foods for new product development Market Survey to identify the new product.

UNIT II PRODUCT DEVELOPMENT 13 Hours

- New Product Development Team
- Sources of New Product ideas
- Designing new product
- Stages of product development Causes of product failure/ success in product development

UNIT III – PRODUCT EVALUATION AND QUALITY CONTROL 14 Hours

Quality attributes–physical,chemical, nutritional, microbial ,and sensory indicators Principles and types of assessment of quality. Subjective and objective methods of evaluation of product quality. Role of sensory evaluation in consumer product acceptance; requirements for sensory analysis-Sensory panel Evaluation of New Product: Nutritional evaluation(estimation of relevant parameters) Evaluation of shelf-life of the product (testing for appropriate quality parameters-physical, chemical, microbiological and nutrient content, acceptability studies) Food safety standards and regulations: Domestic regulations FSSAI, AGMARK, BIS Quality management systems in India;(ISO9001,ISO22000); Global Food safety Initiative; International food standards Various national and international organizations dealing with inspection,trace ability and authentication,certification,and quality.assurance.

UNIT IV- INTRODUCTION OF ENTREPRENEURSHIP:**13 Hours**

- a) Importance of entrepreneurship and its relevance in career growth.
- b) Entrepreneur, entrepreneurship and enterprise.
- c) Concept and development
- d) Characteristics of entrepreneurs
- e) Developing entrepreneurial competencies
- f) Types of enterprise and ownership

UNIT V- FINANCIAL AND MARKETING MANAGEMENT OF ENTREPRENEURSHIP:**13 Hours**

Financial management – Importance and Techniques, Marketing management –Marketing for small business, Financial support from financial institutions

Text Books

- Moskowitz HR, Saguy IS and Straus T(2009).*An Integrated approach to New Food Product Development* .ed. New York, NY:CRC Press
- Paine FA,Paine HY (Eds.)(1992)*A hand book of Food Packaging*(2nd ed.),Blackie Academic and Professional.

Reference Books:

- Earle M., Earle RL. and Anderson A. (2001) *Food Product Development:Maximizing success*,Woodhead Publishing Ltd,FoodSeries,No.64,2001.
- Fuller,GW(2011).*New food product development: From concept to marketplace*.3rd ed. New York, NY:CRC Press
- LawlessHTandKleinBP(1991)*SensoryScienceTheoryandApplicationsinFoods*.MarcelDekkerInc

e-Learning Resources:

- <https://www.destechpub.com/wp-content/uploads/2015/01/Methods-for-Developing-New-Food-Products-preview.pdf>
- <https://www.youtube.com/watch?v=iL0iIGpa4vg>
- <https://www.youtube.com/watch?v=5kOXUH8kaCs>

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the basic concepts in food product development, packaging, costing advertising and marketing.	K1, K2
CO-2	Apply a new food product and evaluate its quality and acceptability	K3
CO-3	Analyze the steps in product selection and form of ownership.	K4
CO-4	Overview the entrepreneurship and its relevance in career growth.	K5
CO-5	Develop the marketing principles for small businesses and demonstrate their ability to adapt marketing and financial strategies to entrepreneurial contexts.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	1	1	1
CO-2	3	3	2	2	2	3
CO-3	3	3	2	3	3	3
CO-4	3	2	2	2	3	3
CO-5	3	3	3	3	3	3

High Correlation: 60% Medium Correlation: 30% Low Correlation:10%

HEALTH PSYCHOLOGY

UCNO502

Semester : V

Category : major Elective-I/ DSE-I

Class &Major: III B.Sc Clinical Nutrition and Dietetics

Credits : 4

Hour/Week: 5

Total Hour: 65

COURSE OBJECTIVES

CO NO	To enable the students to
CO-1	Understand the basic concepts of human behavior and health psychology
CO-2	Gain insight into the psychological and psycho-social factors that affect health
CO-3	Assist the psychological approaches to illness
CO-4	Overview of health interventions relating to diseases
CO-5	Develop a comprehensive understanding of various psychological intervention strategies

UNIT I: FOUNDATION OF HEALTH PSYCHOLOGY

12 Hours

Definition – Health and Health Psychology, Mind Body Relationships, Need for Health Psychology, Bio psycho social model in health psychology.

UNIT II: HEALTH BEHAVIOR

13 Hours

Health Enhancing Behaviors- Exercise, Healthy Eating Practices, Sleep, Weight Management and Health Screening. Health Compromising Behaviors – Alcoholism, Eating Disorders, Smoking.

UNIT III: STRESS

14 Hours

Physiology of stress, sources of stress, coping with stress, factors affecting stress and Stress Management.

UNIT IV: MANAGEMENT OF CHRONIC ILLNESS

13 Hours

Quality of Life, Emotional responses to chronic illness- CVD, Diabetes mellitus and Cancer, coping with chronic illness, patient education, social support interventions and family support.

UNIT V: INTERVENTION STRATEGIES

13 Hours

Rational Emotive Behavioral therapy, Cognitive Behavioral Therapy –Trans theoretical Model of behavior change.

Text Book

- Rodham, K. (2019). Health psychology. Red Globe Press.

References

- Capuzzi, D., & Stauffer, M. D. (2022a). *Counseling and psychotherapy: Theories and interventions*. American Counseling Association.
- Morrison, V., & Bennett, P. (2023). *An introduction to health psychology*. Pearson.
- Rodham, K. (2019a). *Health psychology*. Red Globe Press.

Course Outcomes

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Understand the definition of health psychology and its role in the broader context of psychology and healthcare.	K1
CO-2	Recognize and understand health-compromising behaviours, their risk factors, and potential consequences.	K2
CO-3	Apply knowledge of factors influencing stress and implement stress management techniques.	K4
CO-4	Develop and implement coping strategies for individuals dealing with chronic illnesses.	K5
CO-5	Create an Intervention Strategies to facilitate behavior change in health-related contexts.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	1	1	1
CO-2	3	2	2	2	1	1
CO-3	3	2	2	2	2	2
CO-4	3	2	2	2	2	2
CO-5	3	3	3	3	3	3

High Correlation: 33.3% Medium Correlation: 50.1% Low Correlation: 16.6%

SCIENTIFIC WRITING IN NUTRITION RESEARCH

UCNO501

Semester : V

Credits : 4

Category : Core Elective-I/ DSE-I

Hour/Week: 5

Class & Major: III B.Sc Clinical Nutrition and Dietetics

Total Hour: 65

COURSE OBJECTIVE:

CO NO.	To enable the students to
CO-1	Explain the needs, objectives, importance, problem and process of research based on review of literature.
CO-2	Identify research problems and formulating hypothesis
CO-3	Distinguish between the different types of sampling
CO-4	Examine the methods used in data collection
CO-5	Demonstrate an understanding of writing a research report

UNIT I: AN INTRODUCTION**12 Hours**

Definition- Need and Importance of psychological Research- Objectives of Research - Types of Research - The Research Process - Principles of a Good Research - Problems encountered by researchers in India.

UNIT II: RESEARCH PROBLEM, HYPOTHESIS AND REVIEW OF LITERATURE 13 Hours

Research Problem: Meaning and characteristics of a problem, Types of Problems, Hypothesis: Meaning and characteristics of a good hypothesis –Reviewing the Literature: Purpose of Review - Sources of Review.

UNIT III: SAMPLING**14 Hours**

Meaning and Need for sampling - Fundamentals of sampling- Factors influencing decision to sample- Types of Sampling: Probability and Non probability- Probability Sampling: Simple random, stratified random and area cluster sampling - Non probability sampling: Quota, Accidental, Judgemental or purposive, systematic and snowball sampling

UNIT IV: METHODS OF DATA COLLECTION**13 Hours**

Primary data: Questionnaire and schedule – Interview - Observation as a tool of Data Collection, Difference between Participant observation and non-participant observation Rating Scale, Secondary data: Sources.

UNIT V: WRITING A RESEARCH REPORT**13 Hours**

Meaning- General purpose of writing a research report-of a research report, Styles of writing a research report- Types of research reports- Precautions in writing research report

Text Book:

- Kumar, C. R. (2012). *Research methodology*. APH Publishing Corporation.
- Research and statistics: Strategy and programme: 2002/03-2004/05. (2002). . Northern Ireland Office, *Statistics and Research Branch*.

Course Outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Conduct thorough literature reviews to identify existing gaps and establish the context for the research.	K1 K2
CO-2	Choose appropriate data visualization techniques to enhance clarity and understanding.	K3
CO-3	Demonstrate clarity in conveying complex nutritional concepts to a diverse audience, including both scientific and non-scientific readers.	K4
CO-4	Developed skill of analyzing the data	K5
CO-5	Create comprehensive and well-structured research proposals with a focus on the scientific method and ethical considerations.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	1	1	1	1	1
CO-2	3	2	2	2	2	2
CO-3	3	2	2	3	2	2
CO-4	3	2	2	2	2	2
CO-5	3	3	3	3	3	3

High Correlation : 36.6% Medium Correlation: 46.6% Lower Correlation:16.6%

CLINICAL NUTRITION PRACTICAL UCNR501

Semester : V
Category : core practical V
Class &Major : III B.Sc Clinical Nutrition and Dietetics

Credits : 3
Hour/Week : 4
Total Hour : 52

Course Objective:

CO NO	To enable the students to
CO-1	Develop skills in analysis of urine and estimation in serum
CO-2	Demonstrate proper techniques for blood collection.
CO-3	Interpret A/G ratio results in the context of clinical conditions.
CO-4	Correlate serum urea values with renal function and nutritional status.
CO-5	Recognize the importance of bilirubin in liver function.

PRACTICAL

1. Analysis of urine
2. Collection of blood and separation of plasma and serum
3. Estimation of blood glucose
4. Estimation of total protein
5. Determination of A/G ratio
6. Estimation of serum urea
7. Estimation of serum creatinine
8. Estimation of cholesterol
9. Estimation of Bilirubin

Text books

- Harper. H.A.(1997) *Review of Physiological Chemistry*. 21st edition. Los Angeles, Lange Medical Publications.
- Ramakrishnan. S. and Venkat Rao.. (1995) *Nutritional Biochemistry*. Chennai, T.R. Publications

Course outcome:

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Identify abnormalities in urine composition and correlate them with potential nutritional and health implications.	K1, K2
CO-2	Interpret blood glucose levels in relation to normal physiological ranges and potential implications for nutritional management.	K3
CO-3	Relate cholesterol levels to dietary habits and identify potential nutritional interventions.	K4
CO-4	Conduct bilirubin estimations, recognizing their significance in liver function	K5
CO-5	Create critical thinking skills to make informed recommendations for nutritional interventions based on laboratory results.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	2	1	1
CO-2	3	2	2	2	2	3
CO-3	3	2	2	2	3	3
CO-4	3	2	2	2	3	3
CO-5	3	3	3	3	3	3

High Correlation: 43.3% Medium Correlation: 50.1% Low Correlation: 6.6%

PROJECT UCNP501

Semester	: VI	Credits	:4
Category	: Core XIII / DSC- XIII	Hours/Week	:4
Class & Major:	III B.Sc Clinical Nutrition & Dietetics	Total Hours	:52

An independent research project work undertaken by student under the guidance of a member of the teaching faculty of the concerned department. It can either be a survey or laboratory oriented research. The research should be submitted at the end of semester IV in the form of a thesis.

EVALUATION PATTERN

Internal examination: 40 marks

40 marks are based on the day-to-day work of the concerned student in terms of project

Designing, Practical performance in the laboratory, interpretation of the results obtained, Regularity and any other criteria relevant to the study. Presentation of the work in front of the faculty of the department at least once during this project work is mandatory.

External examination: 60 marks

- Internal evaluation (40 marks)
- Innovative idea - 10 marks
- Performance evaluation - 10 marks
- Report preparation - 20 marks

External evaluation (60 marks)

- Report and presentation - 40 marks
- Viva voce - 20 marks

MEDICAL NUTRITION THERAPY II
UCNM601

Semester	: VI	Credits	:6
Category	: CoreX/ DSC-X	Hours /Week	:6
Class & Major	: III B.Sc Clinical Nutrition &Dietetics	Total Hours	:78

Course Objectives

CO NO	To enable the students to
CO-1	Remember the concepts, and develop dietary management skills for pre-diabetes and diabetes mellitus.
CO-2	Understanding the Facts And formulating dietary strategies for nephritis, nephrosis, acute and chronic kidney injury, nephrolithiasis, and renal replacement therapies.
CO-3	Assess the nutritional status to know the disease prognosis and the ways to combat the abnormality
CO-4	Apply nutritional guidelines and principles in administering appropriate dietary recommendations to the subjects and improve their nutritional status
CO-5	Impart diet counseling to alleviate and cure communicable and non-communicable diseases.

UNIT I: DIET IN DIABETES MELLITUS: 14 Hours

Diabetes Mellitus- definition, Etiology, types of diabetes mellitus, clinical manifestations, hypoglycemia, Complications of diabetes- Acute and Long term. Glycemic Index, Dietary management and food requirement for Pre-diabetes and diabetic mellitus

UNIT II: DIET IN RENAL DISEASES: 15 Hours

Etiology, Symptoms, Nutritional implications and Dietary Management in Nephritis, Nephrosis, acute kidney injury, chronic kidney injury, nephrolithiasis, renal replacement therapies and dialysis.

UNIT III:NUTRITION IN CRITICAL CONDITIONS: 17 Hours

Definition, Etiology, Classification, Metabolic alterations and Dietary management in Metabolic

stress, trauma, burns, cancer, and Auto Immune Disease.

UNIT IV:DIET IN CARDIOVASCULAR DISORDERS AND FOOD-DRUG INTERACTION

17 Hours

Etiology, symptoms, dietary management and role of specific nutrients in hypertension, atherosclerosis and Hyperlipidemia.

Food & drug interaction: Effect of drugs on food and nutrition- nutrient absorption, nutrient metabolism and nutrient excretion, Modification of drug action by food and nutrients.

UNIT V: SPECIAL NUTRITION THERAPY AND DIET IN SURGERY

15 Hours

Specialized Nutrition Support Routes and Techniques:

Enteral nutrition: Indications, types- Nasogastric tube, the percutaneous endoscopic gastrostomy (PEG) tube, and the percutaneous endoscopic jejunostomy (PEJ) tube, formulations, complications and monitoring

Parenteral Nutrition: Indications, types- CPN,PPN, routes, formulations, complications and monitoring

Diet in Surgery :Pre operative and Post-operative diets

Text books

- Srilakshmi B, (2011) Dietetics, sixth edition, New age Publishing Press, New Delhi.
- Stacy N, William's(2005) *Basic Nutrition and Diet Therapy*, 12th edition, Elsevier publications, UK,

Reference books

- Elia M, Ljungqvist O, Stratton RJ, Lanham SA, (2013)*Clinical Nutrition* (The Nutrition Society Textbook), 2nd edition, Wiley Blackwell Publishers.
- Mahan LK, Stump SE and Raymond JL, Krause's (2011) *Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri.
- Stump SE,(2012) *Nutrition and diagnosis related care*, 7th edition, Lippincott Williams and Wilkins, Canada.

E- resources

- www.nal.usda.gov – Food & Nutrition Information Centre.
- www.eatright.org – American Dietetic Organisation.
- www.nin.org- National Institute of Nutrition, Hyderabad, India
- www.icmr.org – Indian Council for medical Research.

COURSE OUTCOME:

CO.NO	On completion of the course the student will be able to	Bloom's Level
CO1	Recall the definition, types, and clinical manifestations of diabetes mellitus.	K2
CO2	Implement dietary modifications to manage abnormalities and optimize renal function.	K3

CO3	Evaluate the nutritional status of patients in critical conditions and modify dietary plans accordingly.	K4
CO4	Assess the impact of dietary interventions on cardiovascular health outcomes.	K5
CO5	Design comprehensive nutrition care plans for surgical patients to optimize their perioperative outcomes.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	2	2	2
CO-2	3	3	2	2	2	2
CO-3	3	3	2	2	3	3
CO-4	3	3	3	2	3	3
CO-5	3	3	3	3	3	3

High Correlation : 80% Medium Correlation: 20% Low Correlation:0%

NUTRITION EDUCATION AND COUNSELING UCNM602

Semester	: VI	Credits	:6
Category	: Core XI / DSC – XI	Hours /Week	:6
Class & Major:	III B.Sc Clinical Nutrition & Dietetics	Total Hours	:78

Course Objectives

CO NO	To enable the students to
CO-1	Remember the concept, scope and steps involved of nutrition education.
CO-2	Understanding of the effective body language and communication skills.
CO-3	Utilize their Knowledge and Identify the Techniques to facilitate behavioral changes.
CO-4	Develop counseling strategies tailored to specific disease conditions
CO-5	Apply different types of media for mass nutrition education and Evaluate the effectiveness of audio-visual aids in conveying nutritional information.

UNIT I - INTRODUCTION TO NUTRITION EDUCATION

14Hours

Nutrition education- definition, steps, strategies involved in nutrition education, educating the community, actions taken to reduce the burden of illness.

UNIT II - COMMUNICATION SKILLS

15 Hours

Body language and communication skills- qualities of a good counselor, assessment, establishing rapport with the clients, self monitoring.

UNIT III - TECHNIQUES AND THEORIES OF COUNSELING

17 Hours

Definition, theories of counseling, behavioral changes- transtheoretical model of change, stages of change- precontemplation, contemplation, preparation, action, maintenance and relapse, cognitive behavioral therapy and motivational interviewing. Activities that facilitate behavior change, resistance behaviors and potential strategies to modify them.

UNIT IV: DIET COUNSELING FOR DIFFERENT DISEASE CONDITIONS 17 Hours

Counseling strategies for different disease conditions- obesity, cardiovascular diseases and renal disorders. Case study approaches, techniques in counseling, effective facilitator- client relationships. Monitoring the process involved in nutrition education- programs for the community, life cycle conditions, most vulnerable groups- group and individual counseling.

UNIT V: ICT IN NUTRITION COUNSELING 15 Hours

power point presentations- patient education strategies. Role plays, puppet shows, different types of media- print/press/mass media- TV /radio media- mass Nutrition education

Text books:

- Mahan Kathleen L, Sylvia Escott Stump, (2012), 13th Edition, Krause's, *Food nutrition and Therapy*, W.B. Saunders Co
- Linda Sretselaar, (2009). *Nutrition Counseling Skills for the Nutrition Care Process*. Jones and Bartlett Pub, Canada.

Reference books:

- Isobel R. Contento, (2011), *Nutrition Education: Linking Research, Theory, and Practice*, Second Edition, Jones and Barlett publishers, Canada
- Calabrese, Richard J.; Holli, Betsy B.; Beto, Judith A.; Maillet, Julie O'Sullivan, (2009), *Communication and education skills for dietetics professionals*, 5th ed. Philadelphia, Pa. ; London: Wolters Kluwer/Lippincott Williams & Wilkins

E-resources:

- www.nal.usda.gov – Food & Nutrition Information Centre.
- www.eatright.org – American Dietetic Organisation.

COURSE OUTCOME:

CO.NO	On completion of the student will be able to	Bloom's Level
CO1	Describe the definition of nutrition education and its importance.	K1,K2
CO2	Apply effective communication techniques in counseling sessions.	K3
CO3	Assess resistance behaviors and devise strategies to modify them.	K4
CO4	Analyze the process of monitoring nutrition education programs and their impact on different population groups.	K5
CO5	Develop innovative ICT-based nutrition education resources and programs.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	2	1	1
CO-2	3	3	2	2	2	2
CO-3	3	3	2	2	3	2
CO-4	3	3	2	2	3	3
CO-5	3	3	3	3	3	3

High Correlation : 56.8% Medium Correlation: 36.6% Low Correlation:6.6%

SPORTS NUTRITION

UCNM603

Semester : VI	Credits :5
Category : Core XII / DSC - XII	Hours /Week :5
Class & Major : III B.Sc Clinical Nutrition &Dietetics	Total Hours :65

Course Objectives

CO NO	To enable the students to
CO-1	Define fitness, articulate its benefits, and identify its components.
CO-2	Discuss the storage of carbohydrates, proteins, and fats in the body and Identify important fuels for exercise.
CO-3	Assess the importance of vitamins and minerals during endurance exercise, resistance exercise, and the recovery process.
CO-4	Analyze characteristics of sports drinks.
CO-5	Identify and address the nutritional needs of diabetic athletes.

UNIT I: INTRODUCTION AND ENERGY REQUIREMENTS: 13Hours

Fitness- definition, benefits, components, conditioning by training, aerobic & anaerobic activities.

Energy and Performance -Energy definition, role of ATP and its inter conversion, storage of carbohydrate, protein and fat in the body, important fuels for exercise.

UNIT II: ROLE OF MACRONUTRIENTS IN SPORTS: 13Hours

Carbohydrates: Role of carbohydrates as an energy source for sports and exercise, Glycogen re-synthesis, CHO Loading, CHO composition for pre exercise, during and recovery period.

Fats: Role of fat as an energy source for sports and exercise, Factors affecting fat oxidation (intensity, duration, training status, CHO feeding), effects of fasting and fat ingestion.

Protein: Protein requirements during endurance and strength training, protein requirement in vegetarian athletes, effect of excess protein intake on athlete's health.

UNIT III: MICRONUTRIENTS: 14 Hours

Importance of vitamins during endurance exercise, resistance exercise and recovery process.

Importance of minerals during endurance exercise, resistance exercise and recovery process

UNIT IV: FLUID INTAKE DURING EXERCISE & SPORTS AND ERGOGENIC AIDS

14 Hours

Impact of exercise on body fluid, hydration assessment, fluid and electrolyte requirements, hypo and hyper hydration. sports drinks-characteristics

Ergogenic Aids - Dietary supplements and ergogenic aids

UNIT V: SPECIAL POPULATION 11 Hours

Nutritional needs of athletes with special needs- Diabetic athlete, young and elderly, travelling athlete.

Text books

- Bean A,(2013)*The Complete Guide To Sports Nutrition*, 7th edition, Bloomsbury, London.
- Srilakshmi B, Suganthi V, Ashok CK.(2018) *Exercise physiology, fitness and Sports Nutrition*. New age international publishers.

Reference books

- Dunford M, (2010.)*Fundamentals Of Sports And Exercise Nutrition*, Human Kinetics, Illinois,
- Jeukendrup A and Gleeson M, (2004) *Sports Nutrition: An introduction to energy production and performance*, Human Kinetics publishers.
- Maughan RJ, Burke LM, (2002) *.Handbook of Sports Medicine & Science- SportsNutrition*, Blackwell Science publications.

Course Outcomes

CO.NO	On completion of the course the student will be able to	Bloom's Level
CO1	Identify the storage forms of nutrition's in the body and their importance as fuel sources for exercise.	K1,K2
CO2	Apply knowledge of macronutrients and composition for different phases of exercise.	K3
CO3	Assess the specific vitamin and mineral needs during different types of exercise and recovery periods.	K4
CO4	Evaluate the characteristics of sports drinks and their role in hydration and performance.	K5
CO5	Develop nutrition plans tailored to the specific needs of special populations in sports and exercise	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	2	1	1
CO-2	3	3	2	2	2	2
CO-3	3	3	2	2	3	2
CO-4	3	3	2	2	3	3
CO-5	3	3	3	3	3	3

High Correlation: 43.4% Medium Correlation: 50% Low Correlation: 6.6%

MEDICAL NUTRITION THERAPY II PRACTICAL

UCNR601

Semester : VI
Category : Core Practical VI
Class & Major : III B.Sc Clinical Nutrition &Dietetics

Credits : 3
Hours /Week : 6
Total Hours : 78

Course Objectives

CO NO	To enable the students to
CO-1	Understand the nutritional status and decide and choose the appropriate dietary modification
CO-2	Demonstrate their understanding of the facts and ideas in identifying the nutritional implications of various diseases.
CO-3	Apply their knowledge and identify the techniques of planning, preparation and execution of therapeutic diets
CO-4	Formulate and administer appropriate dietary modifications and counselling for the patients.
CO-5	Impart diet counseling to alleviate and cure communicable and non-communicable diseases.

1. Planning and preparing a diet for Diabetes mellitus with insulin and without insulin
2. Planning and preparing a diet for Hypertension and Atherosclerosis.
3. Planning and preparing a diet for Nephritis, Nephrosis and ESRD with dialysis
4. Planning and preparing a diet for Cancer
5. Planning and preparing a diet in Burns.

Text Book

- Williams. S.R. (2018). *Nutrition and Diet Therapy*. New York., Mosby Mirror PublishingCo.
- Sri Lakshmi. B. (2018) *Dietetics*. New Delhi ,New Age International Pub.

Course Outcome

CO No.	On completion of the course, the students will be able to	Bloom's Level
CO-1	Gain and understand the skills in planning therapeutic diets.	K1, K2
CO-2	Apply the skills to gauge the extend of deficiencies.	K3
CO-3	Distinguish the symptoms and biochemical parameters for effective administration of diet therapy.	K4
CO-4	Examine the nutritional requirements based on individual patient needs.	K5
CO-5	Compose an appropriate dietary modifications.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	3	3	3	2
CO-2	3	3	2	3	3	2
CO-3	3	3	3	2	3	2
CO-4	3	3	2	2	2	3
CO-5	3	2	3	3	2	3

High Correlation: 60% Medium Correlation: 40% Low Correlation:0%

HERBAL REMEDIES AND ALTERNATIVE THERAPY

UCNO601

Semester : VI

Credits :4

Category : Core Elective – II /DSE – II

Hours /Week:5

Class & Major: III B.Sc Clinical Nutrition &Dietetics

Total Hours :65

Course Objectives

CO NO	To enable the students to
CO-1	Understand the role of nutraceuticals and functional foods in health benefits.
CO-2	Identify the importance of probiotics, prebiotics and symbiotic.
CO-3	Apply the principles of dosage forms in herbal products
CO-4	Analyze the chemical constitution of herbs
CO-5	Assess the knowledge of the principles of herbal cosmetics formulation.

UNIT I – NUTRACEUTICALS AND FUNCTIONAL FOODS

13 Hours

Nutraceuticals, Definitions, Technological aspects of Nutraceuticals and its uses in pharmacological industry and its health benefits.

Functional foods – definition, Properties, Bioavailability and safety issues of functional foods.

UNIT II – PROBIOTICS, PREBIOTICS AND SYMBIOTICS.

13 Hours

Definition, functions, classifications, usage in nutraceuticals and functional food industry

UNIT III - STEPS OF HERBAL FORMULATION

14 Hours

Grinding, extraction, filtration, concentration. Dosage forms-Infusion, decoction, tincture, capsule, medicated wines, syrups, tablets, ointment and creams.

UNIT IV - FUNCTIONAL COMPONENT AND MEDICAL USES OF HERBS

14 Hours

Chemical constitution and medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry, ashoka, Triphala churna, Arjunarishtha (Aristha), and Telam

UNIT V - NUTRIGENOMICS.

11 Hours

Nutrigenomics- Definition, Role of nutrigenomics in human health

Textbooks:

- Karin Kraft, Christopher Hobbs (2011)Pocket Guide to Herbal Medicine Thieme Publisher,
- Deni Bown,(2010) Herbal: The Essential Guide to Herbs for Living, Pavilion Books Publisher.
- R.N.Chopra, S.L.Nayar and I.C.Chopra, (2018) Glossary of Indian medicinal plants, C.S.I.R, New Delhi.,

E-resources:

- www.treelite.com/downloads/Natural-Remedies.pdf

- www.monographs.iarc.fr/ENG/Monographs/vol82/mono82-6A.pdf
- www.arvindguptatoys.com/arvindgupta/handbook-naturecure.pdf

COURSE OUTCOME:

CO.NO	On completion of the course, the student will be able to	Bloom's Level
CO1	Explain the technological aspects of nutraceuticals in the pharmacological industry.	K1,K2
CO2	Apply knowledge to assess the role of nutraceuticals and functional foods in industries.	K3
CO3	Categories the effectiveness of different extraction methods on the potency of herbal formulations.	K4
CO4	Evaluate the efficacy of herbal treatments in comparison to conventional medicine.	K5
CO5	Develop a personalized nutrition plan based on nutrigenomic information for an individual.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	2	2	2	1	1
CO-2	3	3	3	3	2	2
CO-3	3	3	3	3	2	2
CO-4	3	3	3	3	2	3
CO-5	3	3	3	3	3	3

High Correlation: 66.8% Medium Correlation: 26.6% Low Correlation:6.6%

HUMAN DEVELOPMENT

UCNO602

Semester : VI

Credits :4

Category : Major Elective – II /DSE – II

Hours /Week :5

Class & Major: III B.Sc Clinical Nutrition &Dietetics

Total Hours :65

Course Objectives

CO NO	To enable the students to
CO-1	Understand the various stages of prenatal development.
CO-2	Analyze the physical, motor, social, emotional, cognitive, and language development during infancy.
CO-3	Evaluate different parenting styles and their impact on child development.
CO-4	Categorize the adjustments required in marriage, including aspects like sex, finance, career, society, and relationships with in-laws.
CO-5	Assess the physical and psychological changes that occur in old age.

UNIT I -PRENATAL DEVELOPMENT

13Hours

Stages of prenatal development - Prenatal care, Labor-signs and stages of labor,types of birth, post-natal care of mother, adjustments of newborn to temperature, breathing, feeding and elimination.

UNIT II – INFANCY [BIRTH TO 2YEARS] AND EARLY CHILDHOOD [2-6 YEARS]:

13 Hours

Infancy: Development- physical, motor, social, emotional, cognitive and language, care of infants - feeding, bathing, clothing, sleeping, toilet training and immunization.

Early childhood: Development- physical, motor, social, emotional, cognitive and language. Importance of play and play activities, behaviors problems- causes and treatment.

UNIT III - LATE CHILDHOOD [6-12 YEARS] AND ADOLESCENCE [12-18 YEARS]:

13 Hours

Late childhood: Development- physical, motor, social, emotional, cognitive, moral and language, styles of parenting.

Adolescence: Development - physical, motor, social, emotional, moral and cognitive; adjustment problems; sex education

UNIT IV - ADULTHOOD [18-60 YEARS]:

14 Hours

Adulthood: Characteristics and developmental tasks, marriage and adjustments in marriage —sex, finance, career, society and in-laws.

UNIT V - OLD AGE [60 YEARS AND ABOVE]:

11 Hours

Old age: physical and psychological changes, problems of the aged, family attitude towards the aged, place of the aged in Indian society.

Text books:

- Hurrlock EB, (2017) *Child development*, 6th edition, Tat Mcgraw hill education, New York.
- Devadas RP, Jaya N,(2003) *A Textbook on Child Development*, MacMillan India Ltd, New Delhi,

Reference books:

- Walsh BA, Weiser DA, DeFlorio L, and Burnham MM, (2017) *Introduction to Human Development and Family Studies*, Psychology Press,
- Beckett C, Taylor H, (2016) *Human Growth and Development*, 3rd edition, SAGE,
- Peterson GW, Bush KR,(2006). *Handbook of Marriage and the Family*, 3rd edition, Springer US.

E.resources:

- <https://www.alleydog.com/glossary/definition.php?term=Family+Studies>
- <https://www.parents.com/toddlers-preschoolers/development/behavioral/preschoolers-101-understanding-preschooler-development/>
- <https://my.clevelandclinic.org/health/articles/7060-adolescent-development>

COURSE OUTCOME:

CO.NO	On completion of the course, the student will be able to	Bloom's Level
CO1	Understand the importance of pre and post-natal care for both the mother and newborn.	K1,K2
CO2	Apply knowledge to address the developmental needs and care requirements of infants and toddlers.	K3
CO3	Correlate the developmental aspects of late childhood and adolescence in various domains.	K4
CO4	Evaluate the impact of Characteristics and developmental tasks of adulthood.	K5
CO5	Choose the challenges faced by the elderly in society.	K6

CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	2	2	1
CO-2	3	3	3	3	2	2
CO-3	3	3	3	3	3	2
CO-4	3	3	3	3	3	3
CO-5	3	3	3	3	3	3

High Correlation : 77%**Medium Correlation: 19%****Low Correlation:4%****FOOD HYGIENE AND SANITATION****UCNO603****Semester : VI****Credits :4****Category : Core Elective – II /DSE – II****Hours /Week :5****Class & Major: III B.Sc Clinical Nutrition &Dietetics****Total Hours :65****Course Objectives**

CO NO	To enable the students to
CO-1	Understand the hygienic sanitary practices associated with food.
CO-2	Study the relevance of microbiological safety of Food.
CO-3	Apply the various sources of water and their impact on water quality.
CO-4	Analyze the physical and chemical factors influencing cleaning processes.
CO-5	Conclude general sanitary considerations in food plants and their impact on public health.

UNIT I - GENERAL PRINCIPLES OF FOOD HYGIENE**13 Hours**

Hygiene in rural and urban areas with food preparation, personal hygiene, kitchen hygiene and food handling habits; place of sanitation in food plants. Sanitary aspects of building and equipment: plant layout and design.

UNIT II - SAFE AND EFFECTIVE INSECT AND PEST CONTROL **14 Hours**

Extraneous materials in foods, principles of Insects and pest control. Physical and chemical control, effective control of micro-organisms: micro-organisms important in food sanitation, micro-organisms as indicator of sanitary quality. Precaution is to be taken while handling pesticides.

UNIT III - SANITARY ASPECTS OF WATER SUPPLY **14 Hours**

Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water, preventing contamination of potable water supply.

UNIT IV - EFFECTIVE DETERGENCY AND CLEANING PRACTICES **13 Hours**

Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, and cleaning practices.

UNIT V - SANITARY ASPECTS OF WASTE DISPOSAL **11 Hours**

Establishing and maintaining sanitary practices in food plants, role of sanitation, general sanitary consideration and sanitary evaluation of food plants. Training techniques for food service personnel insanitation.

Text books:

- Ananthanarayan , Paniker , Arti Kapil, (2013). *Textbook of Microbiology*. 9th Ed.
- Sheth M and Sukul S (2009). *Food Safety Training Manual for food service providers*. M. S.University Press, Vadodara.
- Pelczar MJ, Chan ECS and Krieg NR (2008). *Microbiology (5th ed.)*. Tata McGraw Hill Publishing Co Ltd, New Delhi

Reference books:

- Jay JM (2004). *Modern Food Microbiology (7th ed.)* CBS Publishers and Distributors, Springer Publications, Delhi.
- William Frazier (2008) *Food Microbiology*, 4th Ed, The Mc Graw Hill Co Inc. Newyork

E- references:

- www.cdc.gov/nceh/ehs/ehsnet/docs/jfp_food_worker_hand_hygiene.pdf

COURSE OUTCOME:

CO.NO	On completion of the course, the student will be able to	Bloom's Level
CO1	Explain the general principles of food hygiene.	K1,K2
CO2	Apply knowledge to effectively control insects, pests, and microorganisms in food handling and processing.	K3
CO3	Ensure potable water supply free from contamination.	K4
CO4	Emphasize the importance of cleaning technology, considering physical and chemical factors	K5

CO5	Develop training techniques for effective waste disposal in food plants.	K6
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CO & PSO Mapping

COS/PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CO-1	3	3	2	2	2	2
CO-2	3	3	3	3	2	2
CO-3	3	3	3	3	3	2
CO-4	3	3	3	3	3	3
CO-5	3	3	3	3	3	3

High Correlation: 76%

Medium Correlation: 24%

Low Correlation: 0%

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
V	Major Core VII / DSC – VII	UCNM501	Clinical Nutrition	Nutrient Chart Preparation	Demo on any one nutrient
	Core VIII/ DSC - VIII	UCNM502	Principles of food preservation	Poster Presentation	Recipe Preparation
	Core IX/ DSC-IX	UCNM503	Food product development and entrepreneurship	Seminar	Product development
	Major Elective-I/ DSE-I	UCNO501	Scientific writing in nutrition research	Seminar	Case study
		UCNO502	Health psychology	Seminar	Case study
VI	Core X / DSC - X	UCNM601	Medical Nutrition therapy - II	Seminar	Diet preparation
	Core XI / DSC - XI	UCNM602	Nutrition education and counseling	Model preparation	Seminar
	Core XII / DSC - XII	UCNM603	Sports Nutrition	Nutrient Chart Preparation	Seminar
	Major Elective-II/ DSE-II	UCNR601	Herbal remedies & Alternative Therapy	Seminar	Product development
		UCNO603	Human Development	Seminar	Model chart preparation
		UCNO603	Food hygiene and sanitation	Seminar	Model chart preparation

DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION

PREAMBLE

UG: Program Profile and the Syllabi of Courses offered in the V and VI semesters along with Evaluation Components III and IV (with effect from 2024-2027)

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon Completion of the Programme, the Students will be able to
PSO1	Recall the fundamental core concepts, theories, key terminology, historical milestones and practices within journalism and mass communication.
PSO2	Understand and interpret media content and diverse perspectives critically.
PSO3	Apply their skills to connect people, ideas, books, media, and technology, thereby contributing to meaningful and impactful communication.
PSO4	Examine professional ethics and responsibilities within the field.
PSO5	Determine the skills in assessing and enhancing teamwork and collaboration within diverse media environments.
PSO6	Generate original and engaging video materials and life-long learning within the ever-evolving socio-technological landscape.

PROGRAMME PROFILE – B.A. JOURNALISM AND MASS COMMUNICATION

Semester	Part	Category	Course code	Course Title	Previous Course Code	Contact Hrs/ week	Credit
							Min/Max
I	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I / French-I		5	3/4
	II	Communicative English / AECC – I	UCEL101/ UCEL102	Communicative English I/ Effective Communicative English I		5	3/4
	III	Major Core /DSC I	UJMM101	Introduction to Mass Communication	-	6	4
	III	Major Core / DSC II	UJMR101	Photography- Practical	-	6	4
	III	Allied – I (GE)	UJMA101	History of Journalism in India	-	6	4
	III	PE	UPEM101	Professional English I	-	6	4
	IV	Value Education (VE)				2	1
TOTAL						36	23/25

II	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL207/ UTAL208/ UHIL202/ UFRL202	Basic Tamil II/ Advanced Tamil- II/ Hindi-II / French-II		5	3/4
	II	Communicative English / AECC – I	UCEL201/ UCEL202	Communicative English II / Effective Communicative English II		5	3/4
	III	Major Core/DSC III	UJMM201	Basics of Journalism	-	6	4
	III	Major Core /DSC IV	UJMR201	Print & Publishing Design	-	5	4
	III	Allied – II(GE)	UJMA201	Theories of Communication	-	6	4
	III	PE	UPEM201	Professional English II	-	6	4
	IV	Non-Major Elective				3	2
	V	Extension Programme/ Physical Education				-	1/2
TOTAL						36	25/28
III	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil II/ Advanced Tamil- II/ Hindi-II / French-II	-	5	3/4
	II	Communicative English / AECC – I	UENL309/ UENL310	General English III/ Advanced English III	-	5	3/4
	III	Major Core /DSC V	UJMM301	Development Communication	-	4	4
	III	Major Core /DSC VI	UJMM302	Specialized Reporting	-	4	4
	III	Allied – III (GE)	UJMA301	Socio-economic and Political issues in India	-	4	4
	III	Allied - III Practical	UJMR301	Print Journal	-	3	3
	IV	Online Course (NPTEL/SP)			-	3	1/2
	IV	Value Education (VE)			-	2	1
TOTAL						30	23/26
IV	I	Languages/ AECC – II Tamil/ Hindi/ French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil II/ Advanced Tamil-II/ Hindi-II /French-II		5	3/4
	II	Communicative English / AECC – I	UENL409/ UENL410	General English II/ Advanced English II		5	3/4
	III	Major Core	UJMM401	Corporate		4	4

		/DSC VII		Communication			
	III	Major Core /DSC VIII	UJMM402	Television Production		4	4
	III	Allied – IV (GE)	UJMA401	Introduction to Indian Constitution		4	3
		Allied – IV Practical	UJMR401	Broadcast Journalism		3	3
	IV	Soft Skill				2	1
	IV	Non-Major Elective				3	2
	V	Extension programme/ Physical Education				-	-/2
TOTAL						30	23/27
V	III	Major Core IX/DSC	UJMM501	Media Laws and Ethics		5	5
	III	Major Core /DSC X	UJMM502	Introduction to Advertising		5	4
	III	Major Core /DSC XI Practical	UJMR501	Television Production		4	4
	III	Major Elective /DSC I	UJMO501	Mobile Journalism		4	4
	III		UJMO502	Web Media Writing			
	III	Major Core /DSC XII	UJMM503	Current Affairs - I		5	4
	III	Major Core/ DSC XIII	UJMP501	Project		5	4
IV	Value Education (VE)				2	1	
TOTAL						30	26
VI	III	Major Core /DSC XIII	JMM601	Media Culture and Society		6	6
	III	Major Core /DSC XIV	UJMM602	Introduction to Film Studies		6	5
	III	Major Core XV/DSC	UJMM603	Current Affairs - II		6	5
	III	Major Core Practical/DSC XVI	UJMR601	Online Journalism		5	5
	III	Major Elective/DSC II	UJMO601	Specialization in Print Journalism		5	5
			UJMO602	Specialization in Broadcast Journalism			
	III	Comprehensive Viva				-	1
	III	Internship				-	-/1
	IV	Soft Skill				2	1
V	Extension programme/ Physical Education				-	-/2	
TOTAL						30	28/32
GRAND TOTAL						192	148/163

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Contact Hrs/week	Credit Min/Max
II	IV	Non-Major Elective	UJME201	Blog Writing	3	2
IV	IV	Non-Major Elective	UJME401	Basics of Advertising and Copy Writing	3	2

MEDIA LAWS AND ETHICS

UJMM501

Semester: V

Category: Major Corer IX

Class & Major: III B.A. Journalism and Mass Communication

Credit : 5

Hours/Week: 5

Total Hours: 65

Course Objectives

Co. No	To enable the students to
CO1	Gain overall awareness on the legal framework
CO2	Understand the legal impact in reporting, writing news, code of ethics, etc.
CO3	Identify the key concepts of freedom of press and the Constitution
CO4	Examine judicial structure and role of Fourth Estate.
CO5	Discuss about the various types of contempt, defamation, right to information and other relevant laws for journalism.

UNIT – I Media and the Indian Constitution

13 Hours

Fundamental rights and directive principles – freedom of speech and expression enshrined in Indian constitution – article 19 (1)a – reasonable restrictions - Concept of the freedom of the press

UNIT - II Regulatory Bodies

13 Hours

Types of law courts – judicial system in India – civil and criminal framework – executive and judiciary – role of fourth estate, Regulatory Bodies: TRAI, CBFC, BCCC

UNIT – III Defamation

12 Hours

Defamation – libel and slander – possibilities and challenges – Case studies

UNIT – IV Media Laws

14 Hours

Contempt of court act – contempt of legislature – official secrets act – press and registration of books act – copy right act – drugs and magic remedies act – working journalist act – right to information –CRPC – IPC - Cinematograph Act – IT Act – Evidence Act - Cyber laws in India

UNIT – V Media Ethics

13 Hours

Media ethics – code of ethics – press council of India – censorship v/s self-regulation

Textbook:

- Neelamalar, M. (2017). *Media Law and ethics*. PHI Learning Private Limited.

Reference Books:

- Kundra, S. (2005). *Media laws and Indian constitution*. Anmol Publications.
- Prasad, K. (2011). *Media law in India*. Kluwer Law International.
- Sanders, K. (2003). *Ethics and journalism*. Sage.

- Thakurta, P. G. (2012). *Media ethics: Truth, fairness, and objectivity*. Oxford Higher Education.
- Saxena, N. (2023). *Media laws and Indian constitution*. Asia Publishers and Distributors.

Course Outcomes:

CO. No	On completion of the course student will be able to	Bloom's Level
CO-1	Acquire the foundation in legal principles and the structure of laws and regulations.	K1, K2
CO-2	Identify the legal impact of journalism.	K3
CO-3	Examine the concepts of freedom of press and the Indian constitution.	K4
CO-4	Explain the judicial structure and role of Fourth Estate.	K5
CO-5	Discuss the laws and ethics regarding media as per the Constitution of India.	K6

CO-PSO Course Mapping

CO\PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	2	2
CO2	3	3	2	3	2	3
CO3	3	3	3	3	1	2
CO4	3	3	3	3	2	3
CO5	3	3	3	3	2	3

High Correlation: 63%

Medium Correlation: 30%

Low Correlation: 7%

INTRODUCTION TO ADVERTISING

UJMM502

Semester: V

Category: Major Corer X

Class & Major: III B.A. Journalism and Mass Communication

Credit : 4

Hours/ Week: 5

Total Hours: 65

Course Objectives

CO. No	To enable the students to
CO1	Acquire the basic concepts of advertising and its development
CO2	Inculcate the knowledge of economy and social aspects of advertising.
CO3	Identify the elements of advertising and its role in mass communication.
CO4	Analyse the functions of advertising agencies and marketing role.

CO5	Develop the role of professional organizations and code of ethics.
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UNIT – I Introduction to Advertising **13 Hours**

Evolution of advertising – definitions – functions – types of advertising.

UNIT – II Current State of Advertising **13 Hours**

Economic and social aspects of advertising – effect of advertising -present status of advertising – 6P’s of advertising – Introduction to Digital Marketing

UNIT – III Introductions to Copy Writing **13 Hours**

Elements of advertising – principles of copy writing – visualization – advertisement script writing for visual media – radio advertisements.

UNIT – IV Advertising Agencies and its Marketing Role **13 Hours**

Media selection – media profile – advertising agencies – positioning – marketing role.

UNIT -V Code of Ethics in Advertising **13 Hours**

Professional organizations – code of ethics – advertising as mass communication.

Text book:

- Barry, P. (2016). *The Advertising Concept Book: Think Now, Design Later*. Thames & Hudson.

Reference Books

- Wiedemann, J. (Ed.). (2021). *Advertising Now*. Print. Taschen.
- Davis, D. (2016). *Creative Strategy and the Business of Design*.
- Hackley, C. (2010). *Advertising*. SAGE.
- Petley, J. (2004). *Advertising*. Smart Apple Media.
- Stanford, E. (2007). *Advertising*. Greenhaven Press.

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom’s Level
CO-1	Describe the Fundamental concepts in advertising, roles of marketing, copy witing and ethics.	K1, K2
CO-2	Identify the economic and social dimensions inherent in advertisements.	K3
CO-3	Discover the self-employment in advertising.	K4
CO-4	Examine the roles played by different advertising agencies within the industry.	K5
CO-5	Discuss about the advertising industry, its functioning and ethics.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	1	3	3	3

High Correlation: 90%

Medium Correlation: 7%

Low Correlation: 3%

TELEVISION PRODUCTION UJMR501

Semester: V

Category: Major Core /DSC XI Practical

Class & Major: III B.A. Journalism and Mass Communication

Credit :4

Hours/Week: 4

Total Hours : 52

Course Objectives

Co. No	To enable the students to
CO1	Acquire knowledge in the technical and aesthetic aspects of TV production.
CO2	Identify the various steps involved in production.
CO3	Practice to develop ideas to telecast.
CO4	Determine the editing techniques for TV Production.
CO5	Create the procedure and techniques of different programme formats

Exercises:

1. Writing for television – Structures, dialogue and format.
2. Translating scripts into visual representation through storyboard.
3. Conducting Interview for TV.
4. Practical Training in online streaming.
5. Broadcasting out news bulletin – news reading, Production.
6. Create a portfolio of live reporting from campus or any social events using mobile or camera with live streaming to YouTube or Facebook.
7. Conduct an on-location interview.
8. News reading with real or imaginary news stories.
9. Experiment with real-time audience interaction, comments, and feedback.
10. Create a short TV commercial for a specific product / one-minute video or PSA.

Text Book:

- Millerson, G., & Owens, J. (2012). *Television production*. Routledge.

Reference Books:

- Zettl, H., & Zettl, H. (2006). *Television production handbook*, Thomas Wadsworth.
- Barker, D. (1985). Television production techniques as communication. *Critical Studies in Media Communication*.
- Ward, P. (2013). *Basic Betacam Camerawork*. Taylor & Francis.
- Zettl, H. (2016). *Sight, sound, motion: Applied media aesthetics*. Cengage Learning.

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	Find how to cover events and news-based stories using mobile phones and video cameras.	K1, K2
CO-2	Show the skills and techniques of television media production.	K3
CO-3	Practice to make ideas for TV programmes.	K4
CO-4	Evaluate the overall effectiveness of the video editing techniques.	K5
CO-5	Develop scripts for various programme formats and can execute it.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	2	2	3	3	3	3
CO4	1	3	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 86%**Moderate Correlation: 10%****Low Correlation:3%****MOBILE JOURNALISM****UJMO501****Semester: V****Category: Major Elective****Class & Major: III B.A. Journalism and Mass Communication****Credit :4****Hours/Week : 4****Total Hours : 52****Course Objectives**

Co. No	To enable the students to
CO1	Find and understand the significant technological advancements that have shaped mobile journalism.

CO2	Explain the techniques and tools used in creating mobile journalism content.
CO3	Apply strategies for crafting shareable content tailored to different social media platforms.
CO4	Analyse the impact of different shooting and editing decisions on the overall quality and coherence of a mobile video story.
CO5	Formulate strategies to counteract the spread of fake news on social media platforms.

UNIT – I Mobile Journalism Fundamentals

11 Hours

How mobile has influenced modern journalism - Mobile centric reporting and editing - Mobile as a ‘Newsroom’ - Mobile News catering to Niche beats.

UNIT – II Mobile Journalism

11 Hours

How to create and share branded mobile journalism content - Introduction to Mobile Applications (News generation and Uploading process: techniques of generating audiences) – News applications – In shorts, Daily hunt, Alt news – Mobile writing and creation of News Trends - Hash tags, tagging, linking accounts etc.

UNIT – III Writing For Mobile Platform

10 Hours

Mobile Friendly writing styles - crafting engaging headlines for mobile, organizing content for search engines and social media.

UNIT – IV Mobile Video Storytelling

10 Hours

Scripting and storyboarding for mobile videos, shooting and editing video stories on mobile, incorporating multimedia elements in stories.

UNIT – V Mobile News Development

10 Hours

The digital skeleton understanding, planning, timing and generating news story, fake news, social media policies and ethics, verification and authenticity.

Textbook:

- Burum, I., & Quinn, S. (2016). *Mojo: The Mobile Journalism Handbook: How to Make Broadcast Videos with an iPhone or iPad*. Focal Press, Taylor & Francis Group.

Reference Book:

- Arm and Mattelart 2003, *The Information Society: An Introduction*, Sage Publications Ltd
- Bradshaw, P., & Cook, T. (2017). *The online journalism handbook skills to survive and thrive in the Digital age*. Routledge.
- Garcia, M. (2019). *The story: Transformation, storytelling, and design in the Mobile News Movement*. Thane & Prose.

Course Outcomes:

CO. No.	On completion of the course student will able to	Bloom's Level
CO-1	Define the global adoption of mobile and its impact on journalism in New Age Media.	K1, K2
CO-2	Practice to use the mobile devices for reporting and engaging with audiences.	K3
CO-3	Examine the implications of global mobile adoption on journalism.	K4
CO-4	Assess the decisions about designing mobile news products across platforms.	K5
CO-5	Create and design mobile infotainment content.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	1	1	2
CO2	2	3	3	3	3	3
CO3	3	1	2	2	1	2
CO4	1	3	3	3	3	3
CO5	1	3	3	3	3	3

High Correlation: 60%

Medium Correlation: 20%

Low Correlation: 20%

WEB MEDIA WRITING

UJMO502

Semester: V

Category: Major Elective

Class & Major: III B.A. Journalism and Mass Communication

Credit : 4

Hours/Week: 4

Total Hours: 52

Course Objectives

Co. No	To enable the students to
CO1	Define the key terms and concepts related to social media writing, including hashtags, captions.
CO2	Explain the unique characteristics of writing for various social media platforms, such as Twitter, Instagram, Facebook, and LinkedIn.
CO3	Identify the ability to adapt writing style and tone to suit different social media audiences and objectives.

CO4	Assess the ethical considerations and challenges in social media writing, including issues related to misinformation, privacy, and community guidelines.
CO5	Develop and execute original social media content strategies.

UNIT - I Introduction to Social Media

11 Hours

The basics of writing for social media - How to write – construction of clear, simple and precise sentences, writing for the reader – Role of reader and broadening the Reader – Response theory, Different kinds of writing – Fiction, Nonfiction (including historical writing, travel writing, memoirs), scientific writing, journalistic writing.

UNIT - II Exploring The New Avenues For Writing

11 Hours

Differences between traditional print writing (Newspapers, magazines, books etc.) and writing in the age of the internet – need to adapt to change - Different forms of media – Print, social media websites, blogs, online platforms, visual media, new media, electronic media, social media - Understanding writing for different media through examples.

UNIT - III Customizing Online Writing Based on the Online Platform

10 Hours

Shorter forms of writing – language, writing style, content, vocabulary, focus, Caption, X feeds/ poems, fanfiction, Instagram stories, Facebook posts, SEO, Meta Descriptions

UNIT - IV New Media and Journalism

10 Hours Concept

and definition of online journalism, Features of online journalism, Types of online journalism (News websites, Blogs: Creation and writing, Citizen Journalism), social media: Facebook, Twitter, Instagram, LinkedIn etc.

UNIT - V Writing For Web

10 Hours

Writing news stories, features and articles for Web, Interview and chats on the web as news source, Mobile digital news formats, Computer Assisted Journalism (CAJ), Introduction to CMS (Content Management System).

Textbook:

- Whitaker, W. R., Ramsey, J. E., & Smith, R. D. (2012). Media writing: Print, Broadcast, and Public Relations. New York: Routledge.

Reference Books:

- Choudhary, R. (2010). Media Writing. New Delhi: Centrum Press.
- Sinha, P. K. (2006). Media Writing. Delhi: Indian Distributors.
- Vander Mey, R. (2004). The College Writer: A guide to Thinking, Writing and Researching. Boston: Houghton Mifflin.

Course Outcomes:

CO. No.	On completion of the course student will able to	Bloom's Level
CO-1	Recall and understand the principles of clarity, purpose, and precision in writing styles for different media.	K1, K2
CO-2	Apply the skills for adaptive writing styles for social media formats.	K3
CO-3	Analyse the impact of writing styles on communication effectiveness.	K4
CO-4	Assess the efficacy of different writing styles in various social media contexts.	K5
CO-5	Develop original form of writing content for social media	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	3	2
CO2	1	3	3	3	2	3
CO3	2	3	3	2	3	3
CO4	1	3	3	3	2	1
CO5	3	3	2	3	3	2

High Correlation: 63%**Medium Correlation: 27%****Low Correlation: 10%****PROJECT****UJMP501****Semester: V****Category: Major Core****Class & Major: III B.A. Journalism and Mass Communication****Credit : 4****Hours/Week : 5****Total Hours : 65****Course Objectives**

Co. No	To enable the students to
CO1	Understand the practical knowledge on making documentary films.
CO2	Identify the current trends in the documentary genre.
CO3	Analyse the production aspects and to elevate the capability of students to critically approach a theme.
CO4	Evaluate the role of documentary films in addressing contemporary social, political, and environmental issues.

CO5	Produce a short documentary film, showcasing all the aspects of film making process.
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This course has designed to provide students with the practical skills needed to plan, produce, and edit documentary films.

The video programmes should be:

- 1) A documentary of 8 to 10 minutes duration
- 2) Produced in the digital video format with sound effects
- 3) Submitted to the concerned faculty member on or before the last day of the 60– days of production period.

Assessment:

S.No	Internal	Evaluation	
		CIA (Valuation Faculty Guide)	ESE Average of (Internal & External Marks)
	Component		
1.	Preparation of Programme Proposal (Clarity of the proposal, budget, research material used & the presentation of synopsis will be taken into consideration)	10	
2.	One – line treatment and detailed treatment	10	
3.	Script	10	
4.	Story board	10	
5.	Viva Voce	10	10
6.	Video Content	5	15
7.	Quality of the video film	5	15
	Total	60	40

Course Outcomes:

CO. No.	On completion of the course student will able to	Bloom's Level
CO-1	Recall and summarize the major shifts and trends in documentary filmmaking.	K1, K2

CO-2	Apply various documentary styles and techniques in the production of a short documentary.	K3
CO-3	Examine and compare the narrative structures employed in various documentaries.	K4
CO-4	Assess the creative decisions made in self-shooting, including choices related to composition, camera angles, and visual storytelling.	K5
CO-5	Develop the skills to become an independent documentary maker.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	3
CO2	3	2	3	2	3	3
CO3	1	3	2	2	2	1
CO4	3	2	3	3	3	3
CO5	3	3	3	3	3	3

High Correlation: 70%

Medium Correlation: 23%

Low Correlation: 7%

CURRENT AFFAIRS – I

UJMM503

Semester: V

Credit : 4

Category: Major Core /DSC XII

Hours/Week: 5

Class & Major: III B.A. Journalism and Mass Communication

Total Hours : 65

Course Objectives

Co. No	To enable the students to
CO1	Recall and explain present-day environmental, political, economic, and social concerns and issues prevalent in India.
CO2	Apply principles of human rights to propose solutions for addressing social injustices and inequalities in India.
CO3	Analyse the complexities of present-day environmental, political, economic, and social concerns within the Indian context.
CO4	Evaluate the effectiveness of existing approaches in addressing present-day challenges and promoting sustainable development in India.
CO5	Design and propose strategies for effectively implementing human rights principles and mechanisms in various sectors of Indian society.

UNIT - 1 Ecology and Environment**13 Hours**

Climate change and Global warming- causes, consequences and remedial measures, Deforestation- causes, consequences and remedial measures, Coastal regulatory Zone- need and importance, CRZ Act, Sustainable development- concept, need and significance, Secular and circular environment – issues.

UNIT - II Human Rights**13 Hours**

UDHR and its significance, CRC and CEDAW, DRD, Fundamental Rights in constitution, educational rights, work place harassment, Refugee rights, physically and mentally challenged rights, Nirbhaya.

UNIT - III Legislative Framework**13 Hours**

Legislative measures concerning India, Women: Constitutional Rights and legal safeguards, Domestic and Family Violence Act of 2012, Sexual Harassment Act at the Work Place 2013, The Criminal Law (Amendment) Act of 2013, Child: Protection of Children from sexual offence Act 2012 (POCSO), Child Labour Act with new amendments, Juvenile Justice (Care and Protection of Children Act) 2000, Education: Right to Education Act 2009, Health: National Health Policy of 2015, Transplantation of Human organs Act of 2002, Prohibition of sale of cigarettes and other tobacco products around educational institutions 2004.

UNIT - IV Political concerns and challenges**13Hours**

Crime and Politics, Corruption: Causes and remedial measures. RTI Act, Lokpal Bill. 44 Whistle-Blowers- Whistle Blowers protection act 2011. Anti- State violence- Nasalism and Maoism and its Impact, Terrorism- causes, consequences and remedial measures.

UNIT - V Economic development and challenges**13 Hours**

Economic development, MNREGA, Food Security Act 2013, Agrarian issues: rural indebtedness, farmers' suicides and its implications, Rural Livelihood, BPL, Micro finance

Textbook:

- Niumai, A., & Chauhan, A. (2022a). *Gender, law and Social Transformation in India*. Springer.

Reference Books:

- Kumar, A., & Meshram, D. S. (2022). *Future of cities: Planning, infrastructure and development*. Routledge.
- Agarwala, R. (2022). *The migration-development regime: How class shapes Indian emigration*. Oxford University Press.
- Cafruny, A. W., & Talani, L. S. (2023). *The political economy of global responses to covid-19*. Palgrave Macmillan, an imprint of Springer Nature Switzerland AG.
- Kumar, A., & Meshram, D. S. (2022). *Future of cities: Planning, infrastructure and development*. Routledge.
- Ram Ahuja, (2012), *Indian social Problems*, Rawat Publications

Course Outcomes:

CO. No	On completion of the course student will able to	Bloom's Level
CO-1	Recall and understand key human rights and their significance within the Indian context.	K1, K2
CO-2	Apply critical thinking to assess the effectiveness of existing policies and strategies in addressing contemporary challenges and promoting sustainable development.	K3
CO-3	Analyse the interplay between present-day problems and broader development goals, considering factors such as globalization, urbanization, and technological advancements.	K4
CO-4	Assess the adequacy of human rights mechanisms and institutions in safeguarding individual liberties and promoting social justice in India.	K5
CO-5	Generate new approaches and initiatives to tackle present-day problems and challenges, fostering sustainable development and social progress.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	3	2	1
CO2	2	2	1	2	1	2
CO3	1	3	2	2	1	1
CO4	3	2	1	1	1	1
CO5	3	2	1	1	1	1

High Correlation: 17%

Medium Correlation: 30%

Low Correlation: 53%

MEDIA CULTURE AND SOCIETY**UJMM601****Semester: VI****Category: Major Core/ DSC XIII****Class & Major: III B.A. Journalism and Mass Communication****Credit : 6****Hours/Week: 6****Total Hours: 78****Course Objectives**

Co. No	To enable the students to
CO1	Describe the various issues related to mass media practices, including ethical dilemmas, industry challenges, and media effects.
CO2	Apply theoretical frameworks to understand the impact of mass media on civil society, critically analysing case studies and examples.
CO3	Analyse the role of mass media in shaping cultural narratives and influencing societal interactions, considering historical contexts and contemporary trends.

CO4	Assess the importance of understanding the digital divide in the context of new media, recognizing its implications for access to information and participation in the digital age.
CO5	Develop a critical perspective on media practices, cultivating the ability to articulate informed opinions on the ethical, social, and cultural implications of media in society.

UNIT – I Media as a Societal Institution

16 Hours

Media and Society. Defining society-Social responsibility and accountability-Themes in media and society: media power and inequality, social integration and identity, social change and development, media impact over space and time. Media and society theories: mass society, critical political economy theory, social shaping of technology, information society.

UNIT – II Media Culture

15 Hours

Media Culture: Defining culture, themes of media: gender and mass media, media commercialisation, communication technology and culture, mass media and post-modern culture.

UNIT - III Media Audience

15 Hours

Media Audience: Definition and types of audience, media audience analysis, active v/s passive audience, theories of audience: Uses and Gratification, Uses and Effects, media as multistep flow, social learning, Cultivation theory.

UNIT - IV Media in the Modern World

16 Hours

Mass media and civil society- politics, democracy and media – new media and social change-digital divide

UNIT - V Media and Popular Culture

16 Hours

Media and popular culture. Understanding culture and sub culture, popular texts, audience as textual determinant, audience as readers, popular discrimination, audience positioning, politics popular culture V/s. people's culture.

Text Book:

- Denis McQuail (2013) Journalism and society, SAGE Publications India Pvt. Ltd., New Delhi

Reference Books

- Denis McQuail (2010) Mc Quail's Mass Communication Theory, 6th ed., SAGE Publications India Pvt. Ltd., New Delhi.
- John Fiske (2000) Understanding Popular Culture, Routledge
- Arthur Asa Berger (1998), Media Analysis Techniques, SAGE publications
- Baran and Davis (2009) Mass communication Theory: Foundation, ferment and future, 5th ed., Wadsworth Cengage Learning.
- Windahl, Signitzer with Olson (2009) Using Mass Communication Theory: An introduction to planned communication, 2nd ed., SAGE publications.

Course Outcomes:

CO. No.	On completion of the course student will able to	Bloom's Level
CO-1	Recall and understand the fundamental concepts in mass media practices.	K1, K2
CO-2	Apply critical analysis to deconstruct the operational framework of various institutions involved in mass media.	K3
CO-3	Examine the reciprocal relationship between media representations and societal perceptions.	K4
CO-4	Assess the role of mass media in shaping public perceptions of government policies and administrative decisions.	K5
CO-5	Develop digital communication initiatives that bridge the digital divide and promote inclusivity.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	3
CO2	1	3	2	1	2	1
CO3	1	3	1	3	1	1
CO4	1	2	1	1	2	1
CO5	1	2	3	3	3	3

High Correlation: 40%**Medium Correlation: 20%****Low Correlation: 40%****INTRODUCTION TO FILM STUDIES****UJMM602****Semester: VI****Credit : 5****Category: Major Core / DSC XIV****Hours/Week: 6****Class & Major: III B.A. Journalism and Mass Communication****Total Hours: 78****Course Objectives**

Co. No	To enable the students to
CO1	Recall the key milestones in the evolution of cinema.
CO2	Understand the use of various camera angles and shots used in film projects.
CO3	Apply montage theory principles to create meaning through the juxtaposition of shots and sequences.
CO4	Assess the key elements, Influences and impacts of each major film movement within the context of the broader history of cinema.

CO5	Develop a comprehensive timeline of the evolution of Indian Cinema highlighting the contributions of different legendary filmmakers of India.
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UNIT - 1 History of World Cinema

16 Hours

Evolution of cinema – origin of cinema and its development into a distinctive visual narrative art form; brief description of the major landmarks in the history of cinema from Lumiere brothers’ actuality shots to the present digital trends; film as an art, industry and political propagandist

UNIT – 2 Visual Elements

15 Hours

Language of cinema – elements of visual composition; shot, scene and sequence; mis-en-scene; visual space; balance; contrast; depth of field; image sizes; camera and subject movements; camera angles; creative use of light and colour; sound effects, ambient sounds, music and dialogue delivery

UNIT - 3 Film Editing Techniques

15 Hours

Basics of film editing – the principles of editing and its functions; evolution of montage theory Film Theories – Auteur Theory, Marxist Theory, Queer Theory,

UNIT - 4 Major Film Movements

16 Hours

Major film movements – German expressionism; Italian neo-realism; French new wave; the Western and Hollywood cinema; Japanese, Latin, Dogme and documentary movies

UNIT - 5 Indian Cinema And Its Renowned Filmmakers

16 Hours

Indian cinema – brief history; great masters of Indian cinema – Satyajit Ray, Mrinal Sen, Ritwik Ghatak, Shyam Benegal, G. Aravindan, Adoor Gopalakrishnan, Mani Kaul, Balachandar & Girish Kasara Vally; Parallel Cinema, popular and middle cinema; film society movement, John Abraham, Govind Nihalani, Anand Patwardhan, Bharati Raja, Vetrimaan.

Textbook

- Andrew Dixx (2005), *Beginning Film Studies*, New Delhi, Viva

Reference Books

- Gerald Mast (1985), *A Short History of the Movies*, Oxford, OUP
- Arthur Asa Berger (1998), *Seeing is Believing: An Introduction to Visual Communication*, New York, Mayfield
- Rudolf Arnheim (1957), *Film as Art*, Los Angeles, University of California Press
- Susan Hayward (2005), *Cinema Studies: Key Concepts*, London, Routledge
- Bill Nichols (1976), *Movies and Methods*, Los Angeles, University of California Press
- Joseph V. Mascelli (1965), *The Five Cs of Cinematography*, Los Angeles, Silman James Press
- Bruce Mamer, *Film Production Technique*, New York, Thomas Wadsworth
- Bernard F. Dick (1978), *Anatomy of Films*, New York, St. Martin’s Press • Louis G. (2004), *Understanding Movies*, New York, Simon & Schuster Co.

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	Gain and understand the major milestones in the evolution of cinema, such as the invention of the motion picture camera, the advent of sound in films, and the transition to colour.	K1, K2
CO-2	Apply various camera angles and shots in the creation of a film scene.	K3
CO-3	Examine the use of montage theory principles in film sequences to convey nuanced meanings.	K4
CO-4	Evaluate the significance of key elements, influences, and impacts of major film movements.	K5
CO-5	Compose a detailed narrative highlighting the contributions of different legendary filmmakers in India, emphasizing their impact on the film industry.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	1	1	1
CO2	1	2	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	2	1	2	1	1
CO5	3	3	2	3	2	3

High correlation: 53%**Medium Correlation: 17%****Low Correlation: 30%****CURRENT AFFAIRS II****UJMM603****Semester: VI****Credit : 5****Category: Major Core / DSC XV****Hours/Week: 6****Class & Major: III B.A. Journalism and Mass Communication****Total Hours : 78****Course Objectives**

Co. No	To enable the students to
CO1	Recognize key social, economic, and political events and issues shaping contemporary society.
CO2	Comprehend the interplay between media and society in influencing public opinion and shaping perspectives.

CO3	Apply critical thinking skills to analyse media content and discern its impact on public discourse.
CO4	Examine the socio-economic and political context of media coverage and its potential biases.
CO5	Develop media campaigns or projects aimed at raising awareness and mobilizing communities for positive social change.

UNIT - I Social Movements and Progress for Society

16 Hours

Define Social Movements, Elements, Types and Stages of Social Movements, Social Movements with reference to Tribal, Women, Farmers, Untouchability, Cultural, Environmental (with special reference to “Swatch Bharat Abhiyaan”), Developmental issues- displacement and rehabilitation, LGBTQR++.

UNIT - II Economic Growth and Development

16 Hours

Economic issues in India, Industry and Economic Growth, New age skills – Make in India, trends and challenges, Entrepreneurship and its relevance, Innovations – Startups.

UNIT - III Political Concerns and Challenges

16 Hours

Crime and Politics, Role of whistle blower, Corruption- causes and remedial measures, Role of political parties and its impact on political system, Changing trends in politics- Functions, features, agendas, majority vs coalition government.

UNIT – IV Social Welfare Schemes by GOI

15 Hours

Women and Child Welfare Scheme - Mission Shakti, PM CARES for Children Scheme, Stree Swabhiman Initiative, Jeevan Jyoti BimaYojana for Women, Balika Samriddhi Yojana, Commerce and Industry (start-up India hub, scheme for IPR-creative India and innovative India, 81 Smart Cities, skill to save life, save a life initiative, national strategic plan and mission (2017-2024) “SAMPARK”, Rural - Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Pradhan Mantri Gram Sadak Yojana (PMGSY).

UNIT - V Social Developments

15 Hours

Define development – Inclusive, Equitable Development, Tribal Issues and Marginalisation of tribals Forest right Act, Land Acquisition Act, Police Reforms, Problems Faced by police and the need for reforms, Refugees (Challenges and impact), Development issues, Displacement and rehabilitation.

Text Book:

- Kumar, A., & Meshram, D. S. (2022). *Future of cities: Planning, infrastructure and development*. Routledge.

Reference Books:

- Cafruny, A. W., & Talani, L. S. (2023). *The political economy of global responses to covid-19*. Palgrave Macmillan, an imprint of Springer Nature Switzerland AG.
- Niumai, A., & Chauhan, A. (2022). *Gender, law and Social Transformation in India*. Springer.

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	List and summarize key social, economic, and political events and issues that have a significant impact on contemporary society.	K1, K2
CO-2	Apply critical thinking skills to analyse media content, illustrating their ability to discern and articulate the impact of media on public discourse.	K3
CO-3	Examining the socio-economic and political context, identifying potential biases, and evaluating the ways in which media framing can influence public perception.	K4
CO-4	Evaluate the credibility and reliability of various media sources, assessing the ethical implications of media strategies employed in reporting and analysing current affairs.	K5
CO-5	Create media campaigns or projects designed to raise awareness and mobilize communities for positive social change.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	1	1	1
CO2	1	3	3	2	1	1
CO3	1	3	1	2	1	2
CO4	1	3	2	3	3	3
CO5	1	3	3	3	3	3

High Correlation: 40%**Medium Correlation: 13%****Low Correlation: 47%****ONLINE JOURNALISM****UJMR601****Semester: VI****Category: Major Core Practical/ DSC XVI****Class & Major: III B.A. Journalism and Mass Communication****Credit: 5****Hours/Week: 5****Total Hours: 65**

Course Objectives

Co. No	To enable the students to
CO1	Recognize the fundamental principles of online journalism, including digital storytelling, multimedia content creation, and audience engagement strategies
CO2	Comprehend the evolving landscape of online journalism, including the impact of digital technologies on news dissemination and the changing expectations of online audiences.
CO3	Apply practical skills in creating and editing online journalistic content, incorporating multimedia elements, and using various digital tools and platforms.
CO4	Analyse the effectiveness of different online journalism formats and styles, considering audience preferences and engagement metrics.
CO5	Produce high-quality online journalism content, considering the unique demands of digital platforms and optimizing for user experience.

Exercises:

1. Experiment with different writing styles (Opinion views/news analysis/feature stories).
2. Create a multimedia story by combining text, image, and videos.
3. Find a dataset related to a current issue and create a data-driven article.
4. Discuss a podcast episode discussing a relevant news topic.
5. Edit news footage by using smart phones.
6. Practice fact-checking articles or news stories.
7. Choose current news events and create a series of tweets and Facebook posts.
8. Engage with your audience by responding to comments and questions.
9. Create a sponsored advertisement.
10. Create a Vlog.

Text Book

- Richard Williams (2009), *The Animator's Survival Kit*, New York, Faber & Faber

Reference Books

- Rao, Bojkovic & Milovanovic (2009), Multimedia Communication Systems, New York, Phi Learning
- Andrew Dewdney & Peter Ride (2006), New Media Handbook, London, Routledge
- Lisa Brenneis & Michael Wohl (2011), Final Cut Pro, Peachpit Press
- Peter Wells (2007), Digital Video Editing: A User's Guide

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	Recall and understand the fundamental principles of online journalism, demonstrating an understanding of digital storytelling, multimedia content creation, and audience engagement strategies.	K1, K2
CO-2	Apply practical skills in creating and editing online journalistic content.	K3
CO-3	Analyse the impact of social media on online journalism and examining the role of platforms, audience behaviour, and the challenges and opportunities presented by the integration of social media into news dissemination.	K4
CO-4	Evaluate the credibility of online sources, employing fact-checking methods.	K5
CO-5	Develop comprehensive online journalism projects.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	1	2	3	3	3	3
CO3	1	3	3	3	3	3
CO4	1	2	3	3	3	3
CO5	1	3	3	3	3	3

High Correlation:80%

Medium Correlation: 7%

Low Correlation: 13%

SPECIALIZATION IN PRINT JOURNALISM

UJMO601

Semester: VI

Credit : 5

Category: Major Elective/DSC II

Hours/Week: 5

Class & Major: III B.A. Journalism and Mass Communication

Total Hours: 65

Course Objectives

Co. No.	To enable the students to
CO1	Identify news value in various stories.
CO2	Understand the process of generating story ideas and researching stories effectively.
CO3	Apply persuasion skills to encourage people to share information for journalistic purposes.
CO4	Analyse the structure of news stories, identifying minor and major complications.
CO5	Craft compelling conclusions for news stories that leave a lasting impact.

UNIT 1: Writing News Stories on Deadline for Publication

13 Hours

Finding stories with news value, Pre-planning versus pre-writing, Crosschecking information quickly writing accurate stories with strong leads for publication.

UNIT 2: Feature Story Ideas

12 Hours

Differences between newspaper and magazine features, how to get ideas for stories, researching stories, Staff writing versus free-lance writing,

UNIT 3: Interviewing

13 Hours

Who to interview, requesting an interview, persuading people to talk to you When and where to interview, preparing for an interview, Conducting an interview

UNIT4: Journalistic Writing

13 Hours

Inverted Pyramid Style, The primacy of structure, Minor and major complications, Complication resolution, building sentences, graphs, sections, and stories, Writing the lead, Writing the body, Writing the end, Feature Writing.

UNIT 5: Editing and Layout

14 Hours

The editor's job, editing news stories

Text Book:

- Tim Holmes, 2010, Magazine Journalism. SAGE Publications Ltd

Reference Books:

- Earl R. Hutchison, 2008, Art of Feature Writing. Oxford University Press
- Shanto Iyengar, Jennifer A, McGrady, 2011, Media Politics: A Citizen's Guide. W.W. Norton
- Hayes, Keith, 2014, Business Journalism: How to Report on Business and Economics: APRESS
- Subhomoy Bhattacharjee, 2017, India's Coal Story.
- Mark Tatge, 2010, New York Times Reader: Business and the Economy

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	Recognize and recall the key elements that contribute to news value in diverse stories.	K1, K2
CO-2	Identify the use of persuasive communication techniques to obtain information from sources.	K3
CO-3	Analyse the structure of news stories, identifying both minor and major complications.	K4
CO-4	Evaluate the significance of minor and major complications in the context of news reporting.	K5
CO-5	Create well-structured conclusions that effectively tie together the elements of a news story.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	1	3	3	2	3	3
CO3	2	3	3	3	2	2
CO4	1	3	2	3	3	3
CO5	1	3	3	2	3	3

High Correlation: 70%**Medium Correlation: 20%****Low Correlation: 10%**

SPECIALIZATION IN BROADCAST JOURNALISM

UJMO602

Semester: VI

Credit : 5

Category: Major Elective/DSC II

Hours/Week: 5

Class & Major: III B.A. Journalism and Mass Communication

Total Hours: 65

Course Objectives

Co. No.	To enable the students to
CO1	Recall the concepts of frame and field, and analyse the scanning process in video technology.
CO2	Illustrate the concepts of satellite and cable broadcasting, emphasizing up linking and downlinking.
CO3	Apply the concepts of interlaced and progressive scanning in a video production scenario.
CO4	Evaluate the impact of different editing techniques on the overall viewer experience.
CO5	Design and implement various editing techniques, including cut in, cut away, jump cut, compression, expansion of time, crosscutting, circular and non-linear cutting, and axial cut.

UNIT 1 Broadcast Technology

13 Hours

Video and Broadcast Technology—Analogue and Digital technology, frame and field, scanning process, Interlaced and Progressive scanning, Composite video signal, Component video signal, Resolution, Aspect ratio. CCU, Colour bars, Vector scope, Waveform monitor, Broadcasting standards-- NTSC, PAL, SECAM and HDTV, Telecine, AM, FM, Community and Campus radio.

UNIT 2 Transmission Technologies

12 Hours

Transmission technologies—Terrestrial transmission; Satellite and Cable broadcasting; Up linking and downlinking, Conditional Access System, DTH; IPTV.

UNIT 3 Roles and Responsibilities

13 Hours

Production Personals and their Role and responsibilities in Radio and Television production, Motion picture production- Three Phases, preparation of budget for various types of Radio and Television Programmes, preparation of script break-down - artiste, location/setting-preparation of shooting schedule.

UNIT 4 Lighting

13Hours

Introduction to lighting: Why do we need to light, mandatory light, creative light,

Characteristics of light: Quality, quantity, colour temperature, three-point lighting, Natural Lighting: Sunlight and the realities, cyclorama, Soft and hard light sources.

UNIT 5 Editing

14 Hours

Linear and Non-linear Editing, On-line and off-line editing, in cam edit. Principles of editing Matching actions, Continuity, Matching Tone, cut in, cut away, Jump cut, compression and expansion of time, Cross cutting, Circular and Non-Linear cutting, Axial cut.

Text Book:

- Stewart, P., & Alexander, R. (2022). Broadcast journalism: Techniques of radio and television news. Routledge.

Reference Books

- Glen Creeper, Toby Miller and John Tulloch, 2009, *The Television Genre Book* London: British Film Institute
- Robert B Musburger and Gorham Kindem, *Introduction to media Production*, Elsevier: Focal Press Focal Press
- Ambrish Saxena, *Radio in New Avatar- AM to FM*, (Delhi: Kanishka)
- Ted White and Frank Barnas, 2012, *Broadcast News, Writing Reporting & Producing*, Elsevier, Focal Press
- Herbert Zettl, *Television Production Handbook*, 2007, Delhi: Akash Press
- F. Vinod Pavarala, Kanchan K Malik, 2007, *FACILITATING COMMUNITY RADIO IN INDIA: Profiles of NGOs and their Community Radio Initiatives Other Voices*, New Delhi: Sage

Course Outcomes:

CO. NO.	On completion of the course student will able to	Bloom's Level
CO-1	Recall and explain the concepts of frame and field in the context of video production.	K1, K2
CO-2	Apply the principles of up linking and downlinking in the context of satellite and cable broadcasting.	K3
CO-3	Assess specific broadcast content to identify how editing choices contribute to or detract from emotional and intellectual engagement.	K4
CO-4	Evaluate the impact of different editing techniques on the overall viewer experience.	K5
CO-5	Design and implement various editing techniques, including cut in, cut away, jump cut, compression, expansion of time, crosscutting, circular and non-linear cutting, and axial cut.	K6

CO-PSO Course Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	3	3	3	3
CO2	3	2	3	1	1	2
CO3	1	3	3	3	3	3
CO4	2	1	3	3	3	3
CO5	1	3	3	3	3	3

High Correlation: 70%

Medium Correlation: 10%

Low Correlation: 20%

III AND IV EVALUATION COMPONENTS OF SEMESTERS V AND VI

Semester	Category	Course Code	Course Title	Component III	Component IV
V	Major Core IX/DSC	UJMM501	Media Laws and Ethics	Seminar	Assignment
	Major Core /DSC X	UJMM502	Introduction to Advertising	Seminar	Surprise Test
	Major Core /DSC XI Practical	UJMR501	Television Production	Seminar	Assignment
	Major Elective/DSC I	UJMO501	Writing for Mobile Application	Seminar	Review Writing
		UJMO502	Writing for social media	Seminar	Assignment
	Major Core /DSC XII	UJMM503	Current Affairs - I	Seminar	Article Writing
VI	Major Core /DSC XIII	UJMM601	Media Culture and Society	Seminar	Assignment
	Major Core /DSC XIV	UJMM602	Introduction to Film Studies	Seminar	Surprise Test
	Major Core XV/DSC	UJMM603	Current Affairs - II	Seminar	Assignment
	Major Core Practical/DSC XVI	UJMR601	Online Journalism	Seminar	Review Writing
	Major Elective/DSC II	UJMO601	Specialization in Print Journalism	Seminar	Article Writing
		UJMO602	Specialization in Broadcast Journalism	Seminar	Assignment

SOFTSKILLS

PREAMBLE

Course Profile and Syllabi for Soft Skills offered to under Graduate Students in III & IV Semesters is presented in this Booklet. This comes into Effect from 2023–2026 Batch onwards.

UG-COURSE PROFILE FOR SOFT SKILLS

Semester	Part	Course Code	Course Title	Contact Hours/ Week	Credit
III	IV	USKS302	Team Skills	2	2
		USKS303	Professional Skills	2	2
IV	IV	USKS405	Social Media and Cyber Security	2	2
		USKS406	Career Opportunity Skills	2	2

TEAM SKILLS USKS302

Semester : III
Category : Soft Skills
Class : II UG

Credit :2
Hour/Week :2
Total Hours : 26

Objectives

To enable the students

- Understand the significance of team skills and know how to acquire them.
- Design, develop, and adapt to situations as individuals and as team members.
- Develop Team Building Skills.

UNIT–I COGNITIVE AND NON-COGNITIVE SKILLS

6 Hours

Cognitive Skills - Meaning, Definition, Types of Cognitive Skills, Strategies to develop Cognitive Skills. Critical Thinking Skills – Problem-solving skills, Ability to Learn.

Non-Cognitive Skills Meaning, Definition, Types of Non-cognitive Skills, Strategies to develop Non-cognitive Skills.

UNIT–II PRESENTATION SKILLS

5 Hours

Presentation Skills – Meaning, Definition ,Types of Presentations, Internal and External Presentation, Knowing the Purpose, Knowing the Audience, Opening and Closing a Presentation, Using Presentation tools, Handling Questions, Presentation to Heterogenic

Group - Ways to Improve Presentation Skills Over Time.

UNIT-III TRUST AND COLLABORATION

5 Hours

Trust and Collaboration – Meaning, Definition , Importance of Trust in Creating a Collaborative Team, Agree to Disagree and Disagree to Agree – Spirit of Teamwork. Understanding Fear of Being Judged and Strategies to Overcome Fear.

UNIT-IV LISTENING AS A TEAM SKILL

5 Hours

Listening – Meaning, Definition, Advantages of Effective Listening, Listening as a Team Member and Team Leader. Use of active listening strategies to encourage sharing of ideas(full and undivided attention, no interruptions, no pre-think, use empathy, listen to tone and voice modulation, recapitulate points).

UNIT-V BRAINSTORMING & SOCIAL AND CULTURAL ETIQUETTES

5 Hours

Brainstorming as a Technique to Promote Idea Generation- Brainstorming – Meaning, Definition and the Process- Procedure for Conducting Brainstorming- Importance of Using Brainstorming Technique, Types of Brainstorming.

Social and cultural etiquettes – Need for Etiquette (impression, image, earn respect, appreciation).Aspects of Social and Cultural/ Corporate Etiquette in Promoting Teamwork. Importance of Time, Place, Propriety and Adaptability to Diverse Cultures.

Learning Outcomes:

On completion of this course the student will be able to

- Understand and actively use team communication tools.
- Identify , appreciate and demonstrate team skills.
- Practice interpersonal skills for better relations with seniors, juniors, peers and stakeholders.

Text Books

- Aggarwal, R.S. 2010. A Modern Approach to Verbal and Non Verbal Reasoning. S.Chand, New Delhi.
- Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press. Egan, Gerard. (1994).
- Khera ,Shiv 2003. You Can Win. Macmillan Books , Revised Edition.
- Aswathappa,Organizational Behavior,TataMcGraw Hill Publication,New Delhi.

MATERIAL : Audio- video materials, online platform (SWAYAM), future skills platform, Global Business Foundation Skills(GBFS) on the website.

EVALUATION COMPONENTS

1. Assignment - 30 Marks
2. PPT Presentation - 30 Marks
3. Group Discussion - 40 Marks

Total = 100 Marks

PROFESSIONAL SKILLS USKS303

Semester : III
Category : SoftSkills
Class : II UG

Credit : 2
Hour/Week : 2
Total Hour : 26

Objectives:

To enable the students

- Identify common communication problems.
- Create Self-Acceptance and Positive Attitude.
- Develop Professional Skills.

UNIT- I COMMUNICATION

5 Hours

Communication - Meaning – Definition - Types of Communication – Barriers to Communication.

UNIT- II COMMUNICATION PROCESS

6 Hours

Communication Process - Meaning – Definition – Listening – Speaking – Reading – Writing and Different Modes of Writing

UNIT – III PROFESSIONAL COMMUNICATION

5 Hours

Professional Communication - Meaning – Definition – Use of various Channels for Transmitting Information including Digital and Physical to team members.

UNIT – IV DIGITAL LITERACY

5 Hours

Digital Literacy - Meaning – Definition – Basic Computer Skills – Introduction to MS Office Suite – Introduction to MS Excel – Introduction to MS Word and Introduction to MS PowerPoint.

UNIT – V VIRTUAL PLATFORMS AND CYBER SECURITY

5 Hours

Virtual Platforms - Meaning – Definition – Basic Virtual Platforms – Zoom – Google Meet – Cisco Webex – MS Teams

Learning Outcomes:

On completion of this course the student will be able to

- Understand the concept of Professional Communication.
- Know to Turn Negative Thinking Patterns into Positive.
- Realize the Importance of Digital Communication Skills.

Text Books

- Aggarwal, R.S. 2010. A Modern Approach to Verbal and Non Verbal Reasoning. S.Chand, New Delhi.
- Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press. Egan, Gerard. (1994).
- Rajendra Paul, Korlahalli (1999),Business Communication,Sultan Chand,New Delhi.
- Khera ,Shiv 2003. You Can Win. Macmillan Books , Revised Edition.

MATERIAL : Audio- video materials, Instructor - led Training, Supplemented by online platform (SWAYAM).

EVALUATION COMPONENTS

- | | |
|-------------------------|-------------------|
| 1. Assignment | - 30 Marks |
| 2. Group Discussion | - 30 Marks |
| 3. Practical Assessment | - <u>40 Marks</u> |

Total = 100 Marks

SOCIAL MEDIA AND CYBER SECURITY

USKS405

Semester : IV

Category : SoftSkills

Class : II UG

Credit : 2

Hour/Week : 2

Total Hour : 26

Objectives:

To enable the students

- Identify Social Media Platforms.
- Create Self Awareness of the positive and negative aspects of social media.
- Develop Professional communication Skills through the digital media.

UNIT- I SOCIAL MEDIA

6 Hours

Social Media – Meaning, Definition, Importance of Social Media, Types of Social Media

UNIT- II DIGITAL MARKETING

5 Hours

Digital Marketing – Meaning, Definition, Importance of Digital Marketing , Traditional Vs Digital Marketing – Digital Marketing Tools

UNIT- III CYBER SECURITY

5 Hours

Cyber Security – Meaning, Definition, Threats, Vulnerabilities and Consequences, Persistent Threats , State of Security in Current World , Importance of Security

UNIT- IV TYPES OF ATTACKS AND ATTACKERS

5 Hours

Different types of Cyber Attacks (Phishing, Social Engineering, Piggyback etc Types of Cyber Attackers and Objectives. White Hat,Black Hat and Grey Hat Attackers.

UNIT- V ART OF PROTECTING SECRETS

5 Hours

Understanding Encryption and Decryption and its Different Types – Art of Data Masking – Firewall and its Proper Use in Cyber Protection.

Learning Outcomes:

On completion of this course the student will be able to

- Understand the concept of Professional Communication.
- Know to Turn Negative Thinking Patterns into Positive.
- Realize the Importance of Cyber Security.

Text Book

- Jeetendra Pande(2017) Introduction to Cyber Security

E- Resources

- https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf
- <http://larose.staff.ub.ac.id/files/2011/12/Cyber-Criminology-Exploring-Internet-Crimes- andCriminal- Behavior.pdf>
- <http://www.uou.ac.in/sites/default/files/slm/FCS.pdf>
- https://cyber-cops.com/book_detail

MATERIAL : Audio- video materials, Instructor - led Training, Supplemented by online platform (SWAYAM).

EVALUATION COMPONENTS

1. Assignment - 30 Marks
2. Poster Presentation - 30 Marks
3. Group Discussion - 40 Marks

Total = 100 Marks

CAREER OPPORTUNITY SKILLS USKS406

Semester : IV

Category : SoftSkills

Class : II UG

Credit: 2

Hours/Week: 2

Total Hours:26

Objectives:

To enable the students

- Acquire career Skills and to partake in and fully pursue a successful career path.
- Prepare a good resume,prepare for interviews and group discussions..
- Explore the desired career opportunities.

UNIT – I PROFESSIONAL GROOMING

5 Hours

Professional Grooming - Meaning – Definition – Good manners and Etiquettes – Professional Grooming and Presentation skills.

UNIT - II RESUME WRITING

6 Hours

Meaning – Definition – Basic of Resume Formats – Types of Resume – Chronological, Functional and Mixed Resume – Steps in preparation of Resume- Difference between a CV, resume and biodata.

UNIT – III INTERVIEW SKILLS

5 Hours

Meaning – Definition – Preparation for Interview – Types of Interviews –(F2F,telephonic, video etc)-Prepare comment critically on simulated on simulated interview

UNIT – IV GROUP DISCUSSION SKILLS

5 Hours

Meaning – Definition – The salient features of GD- Factors that influence GD – Preparation of GD Procedure of GD – Tips for success in GD - Methods of GD - Outcome of GD.

UNIT – V EXPLORING CAREER OPPORTUNITIES

5 Hours

Knowing yourself – personal characteristics. Knowledge about the world of work, requirements of jobs, including self-employment – sources of career information- preparing for a career based on potential and availability of opportunities.

Learning Outcomes:

On completion of this course the student will be able to

- Understand the concept of Professional Grooming.
- Actively participate in group discussion towards gainful employment
- Participate in a simulated interview

Text Books

- Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press. Egan, Gerard. (1994).
- Rajendra Paul, Korlahalli (1999),Business Communication,Sultan Chand,New Delhi.
- Khera ,Shiv 2003. You Can Win. Macmillan Books , Revised Edition.
- Aswathappa,Organizational Behavior,TataMcGraw Hill Publication,New Delhi.

MATERIAL : Audio- video materials, Instructor - led Training, Supplemented by online platform (SWAYAM).

EVALUATION COMPONENTS

1. CV Preparation	- 30 Marks
2. Group Discussion	- 30 Marks
3. Mock Interview	- <u>40 Marks</u>
Total	= <u>100 Marks</u>